ULTRASOUND GUIDED SUPRAINGUINAL VERSUS INFRAINGUINAL APROACH OF FASCIA ILIACA COMPARTMENT BLOCK FOR POSTOPERATIVE ANALGESIA IN ABOVE KNEE LOWER LIMB SURGERIES: A PROSPECTIVE RANDOMIZED STUDY

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Submitted By

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DECLARATION BY THE CANDIDATE

I hereby declare that the thesis entitled **"ULTRASOUND GUIDED SUPRAINGUINAL VERSUS INFRAINGUINAL APPROACH OF FASCIA COMPARTMENT BLOCK FOR POSTOPERATIVE ANALGESIA IN ABOVE KNEE LOWER LIMB SURGERIES: A PROSPECTIVE RANDOMIZED STUDY"** submitted towards partial fulfillment of the requirements for the award of **MD in Anaesthesiology** degree to BFUHS is a compilation of original work carried out by me under the supervision of **Dr. Mirley Rupinder Singh**, Professor, Department of Anaesthesiology, **Dr. Gurpreeti Kaur**, Associate Professor, Department of Anaesthesiology and **Dr. Rajnish Garg**, Professor & Head, Department of Orthopaedics No part of this thesis has formed the basis for the award of any degree previously.

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Dedicated

to

my family

&

Teachers

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Onwards and upwards !

Dr.Sunanda Sethi

LIST OF ABBREVIATIONS

FICB	Fascia Iliaca Compartment Block
USG	Ultra Sound Guided
NRS	Numerical Rating Scale
NSAIDS	Non-Steroidal Anti-Inflammatory Drugs
ERAS	Enhaced Recovery After Surgery
RA	Regional Anaesthesia
PNB	Peripheral Nerve Block
FNB	Femoral Nerve Block
FN	Femoral Nerve
ON	Obturator Nerve
LCNT	Lateral Cutaneous Nerve of Thigh
LA	Local Anaesthetic
IL	Inguinal Ligament
LFCN	Lateral Femoral Cutaneous Nerve
PCA	Patient Controlled Analgesia
AON	Accessory Obturator Nerve
US	Ultra Sound
IM	Iliacus muscle
ASIS	Anterior Superior Iliac Spine
FI	Fascia Iliaca
SM	Sartorius Muscle
SA	Spinal Anaesthesia
EA	Epidural Anaesthesia
VAS	Visual Analogue Scale
CSEA	Combined Spinal Epidural Analgesia
PENG	Pericapsular Nerve Group Block

ABSTRACT

Introduction: Ultrasound guided (USG) Fascia Iliaca Compartment Block (FICB) is being used widely for postoperative analgesia in patients undergoing hip and thigh fracture fixation and arthroplasty. We aim to compare the analgesic efficacy of infrainguinal approach of FICB with the suprainguinal approach.

Aims & Objectives: To compare the analgesic efficacy of USG suprainguinal approach of FICB with infrainguinal approach of FICB for postoperative pain relief.

Materials & Methods: After approval from institutional ethics committee, 50 patients undergoing above knee lower limb orthopaedic surgeries were recruited & allocated randomly into groups S and I. All patients received spinal anesthesia after which USG FICB was performed using suprainguinal approach in group S and infrainguinal approach in Group I, with 0.2% ropivacaine (30 mL). Intravenous tramadol was used as rescue analgesia when Numerical Rating Scale (NRS) score was ≥ 4. Total amount of tramadol consumption in 24 hours was compared between the two groups. NRS scores every hourly for first 24 hours postoperatively, duration of analgesia, postoperative nausea & vomiting and patient satisfaction score were recorded as secondary outcomes. Data thus collected was statistically analysed.

Results: Mean 24 hour tramadol consumption was significantly less in group S than group I. NRS scores were found to be significantly lower in group S as compared to group I at 24 hours post-operatively. The duration of analgesia was significantly prolonged in group S than in group I. Incidence of post operative nausea and vomitting and patient satisfaction score was comparable in both the groups.

Conclusion: Suprainguinal FICB is more efficient than the infrainguinal FICB for postoperative analgesia in above knee lower limb orthopaedic surgeries with significant opioid sparing effect postoperatively.

Keywords: Ultrasound guided, Fascia iliaca compartment block, NRS, Post operative Analgesia, Ropivacaine

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INTRODUCTION

Lower limb fractures of long bones and arthroplasty surgeries of hip and knee have been associated with severe postoperative pain requiring substantial narcotic administration for analgesia.[1] Fracture related pain both before and after surgery is usually reported as severe by most patients. Those who report more severe pain after surgery have longer hospital stays and greater delays before mobilization.

Adequate postoperative analgesia is essential for early rehabilitation and mobilization, and patient satisfaction. Various options for postoperative analgesia include parenteral analgesics like opioids, non-steroidal anti-inflammatory drugs (NSAIDs) and regional anaesthesia techniques including central neuraxial techniques like epidural analgesia and wide range of peripheral nerve blocks that are becoming increasingly popular choice now. Currently, there is no consensus on the best strategy for perioperative anaesthesia and postoperative analgesia.

The ideal method of pain relief would include ease of administration, lack of major side effects and the ability for the patient to be discharged from the Post Anaesthesia Care Unit with hope of maximum pain free hours and minimal side effects. Within the scope of enhanced recovery after surgery (ERAS) protocols, a variety of Regional anaesthesia techniques have been shown to improve analgesia, compared to opioids.[2,3]

Regional Anaesthesia (RA) techniques can play an important role in limiting analgesia and reducing opioid consumption, thus improving functional recovery as well as patient satisfaction. By reducing opioid consumption, RA may also decrease opioid-related side effects. However, it is important that the analgesia of RA technique lasts for a substantial time period after surgery in order not to interfere with early rehabilitation and mobilization.[4,5] A faster recovery might also result in a faster hospital discharge and, therefore, have a positive economic effect.[6,7]

Patients having lower limb fractures are usually elderly with multiple co-morbidities and experience varying intensity of pain necessitating the use of either parenteral or central neuraxial techniques like continuous epidural analgesia for postoperative pain relief. Both these modalities are fraught with adverse side effects like drowsiness or motor block which may adversely affect dynamic pain relief and rehabilitation. Therefore the need for effective postoperative pain control after lower limb surgeries has led to the development of numerous regional analgesic techniques. Out of all the regional anaesthesia techniques, Peripheral Nerve Blocks (PNB) are reported to be more effective for perioperative pain management than other analgesic techniques.[8] Because peripheral nerve blocks confine anaesthesia to the surgical region, many disadvantages of neuraxial blocks can be avoided.

Many techniques of PNB have been used to provide adequate analgesia with opioid sparing for patients with hip fractures which include femoral nerve block (FNB), 3-in-1 block, fascia iliaca compartment block (FICB), intra-articular injections and local anaesthetic infiltration in soft tissues surrounding surgical site (the last being suitable for postoperative pain only).[8] With the assistance of a complete understanding of relevant anatomy, these techniques can be performed safely and effectively with minimal patient discomfort and a high degree of patient satisfaction.[9]

Paraesthesia and nerve stimulation have been used for decades to locate the nerves during the performance of regional anaesthesia. Nerve stimulation remains unreliable, due to its low sensitivity, in terms of detecting the intraneural positioning of the needle. [10] Over the last two decades, ultrasonography has been used to improve the success of RA and prevent nerve damage.[11]

With the latest advancements in regional anaesthesia techniques, the Fascia Iliaca Compartment Block (FICB) has been widely used for

perioperative analgesia in patients undergoing lower limb fracture fixation & arthroplasty.

To begin with, Winnie et al. renewed general interest in regional anesthesia for lower extremity surgeries by explaining a multieffective block of the lumbar plexus nerves supplying the thigh with a single injection of reasonable amounts of local anesthetic, the ”3-in-1” block. [12] However, the block fails to provide adequate anesthesia in areas supplied by the lateral cutaneous nerve of the thigh and the obturator nerve.

The sensory nerve supply to the hip joint includes the Femoral Nerve (FN) ,Obturator Nerve (ON), articular branches of the sciatic nerve, nerves supplying quadratis femoris, and superior gluteal nerve. Sensory innervation of the skin on the lateral thigh is supplied by the Lateral Cutaneous Nerve of Thigh (LCNT) and by the lateral cutaneous branch of the subcostal nerve. Sensation to the upper anterior portion of the thigh is supplied by the ilioinguinal and genitofemoral nerves .The FN, ON, and LCTN arise from the lumbar plexus, whereas the sciatic nerve, nerve supplying quadratis femoris, and superior gluteal nerve arise from the sacral plexus. Therefore, anaesthesia of the hip joint cannot be fully achieved with a FICB alone.

All of these nerves lie within the fascia iliaca compartment at the proximal end of their anatomical course, and therefore placement of Local Anaesthetic (LA) beneath the fascia iliaca should, in theory, result in anaesthesia of FN, ON, and LCNT. The genitofemoral nerve runs on the anterior aspect of the psoas muscle posterior to the fascia iliaca and therefore, the FICB may also result in anaesthesia of the genitofemoral nerve Using this knowledge, Dalens reevaluated the gross anatomy of the lumbar plexus nerves and fascias of the groin and thigh in children. The findings supported the hypothesis that sufficient amounts of a solution injected posterior to the fascia iliaca could spread at the inner surface of

this fascia and contact the femoral, lateral cutaneous, genitofemoral, and obturator nerves that run, at least partly, immediately posterior to the fascia.[13]

In 2007, Stevens modified the FICB as described by Dalens. The needle was advanced through the skin at a right angle 1 cm above the Inguinal Ligament (IL) as opposed to 0.5 cm caudal of the IL in the classic Dalens' method, at the junction of the middle. He hypothesized that injecting 40 mL of LA above the IL would allow the LA to block the lumbar plexus at a higher level. He demonstrated a significant reduction in morphine consumption at 24 hours (37 mg vs 22 mg) when this technique was compared to a sham block.[4]

Some studies have been conducted on cadavers in which the course of Lateral Femoral Cutaneous Nerve (LFCN) has been carefully examined in the anterior approach of total hip arthroplasty which suggest that above the inguinal ligament, LFCN has a more predictable course,superficial to iliacus muscle and deep to fascia iliaca in pelvis. [14,15] Furthermore, the modified suprainguinal approach of FICB advised by Stevens has more proximal spread of local anaesthetics, which is also described in a cadaveric study. [16]

There are two techniques of Fascia Iliaca Compartment Block (FICB) administration that have been described in the literature, a conventional infrainguinal approach by Dalens [13] and a modified suprainguinal approach by Stevens. [4]

The recent scientific advances have made the use of ultrasound possible as a guiding tool in various techniques of regional anaesthesia. It has also come up as the gold standard modality in peripheral nerve blockade. It has been found that ultrasound guided FICB increased the frequency of sensory loss in medial aspect of thigh and it also increased the frequency of femoral nerve and obturator nerve motor block. [17]

The FICB has evolved from a blind para-vascular infra-inguinal technique to an UltraSound (US) guided supra- inguinal technique. The most important landmark for the various approaches is the place of injection of the LA with regard to the inguinal ligament (IL) [18]

Among the choices available for local anaesthetic drugs, 0.2% Ropivacaine has been reported to have a lower incidence of motor block than Bupivacaine. So use of Ropivacaine promotes early mobilisation in post operative period. [19]

Since there are very few studies comparing the suprainguinal approach with the infrainguinal approach of FICB for postoperative pain relief, hence we propose to compare the efficacy of ultra sound guided suprainguinal approach of FICB with that of infrainguinal approach of FICB for postoperative pain relief in above knee lower limb orthopaedic surgeries.

AIMS & OBJECTIVES

To compare the efficacy of ultra sound guided suprainguinal approach of FICB with that of infrainguinal approach of FICB for postoperative pain relief in above knee lower limb orthopaedic surgeries.

REVIEW OF LITERATURE

Pain is a sensory emotional experience. It originates from external noxious stimuli from the environment that cause a localized sensation in a part of body, to which the individual's response will be to terminate or escape the source of stimulus.

Orthopaedic surgery is considered one of the most painful procedures during the post-operative period. Poorly controlled postoperative pain is the source of discomfort, non-planned hospitalisation, readmission, metabolic complications, delayed functional recovery and patient dissatisfaction.

In lower limb orthopedic surgeries, severe inflammation leading to high intensity pain is often seen. Inefficient pain control also leads to major discomfort to the patient and delayed mobilisation which increases the risk of deep vein thrombosis. Conventional methods of pain relief include NSAIDS or opioid administration intravenously either in the form of intermittent boluses or Patient Controlled Analgesia (PCA) infusion. These methods have their own side effects like nausea, gastrointestinal ulcers, renal failure and post operative delirium, sedation, respiratory depression etc seen with NSAIDS and opioids respectively.

Epidural analgesia was very commonly used for post-operative pain management in lower limb orthopedic surgeries. Epidural anaesthesia with an indwelling catheter ensures pain relief for longer periods but can lead to serious but rare complications like epidural hematoma, catheter displacement, nerve damage or epidural infection. [20] Also, epidural administration of only local anaesthetic is associated with risk of motor blockade and delayed mobilization.

Out of all the regional anaesthesia techniques, nerve blocks are reported to be more effective for perioperative pain management than other

analgesic techniques. Peripheral nerve blocks confine anaesthesia to the surgical region, therefore avoiding side effects of neuraxial blocks.

In a recent Cochrane systematic review peripheral nerve blocks (PNB) were compared to systemic analgesia for pain control after elective hip replacement surgery in adults. They found out that there was reduction in postoperative pain, increased patient satisfaction, and reduction in both postoperative delirium and length of hospital stay in patients who received peripheral nerve blocks. **[8]**

In a review study by G. Joshi and Shelby L. Corman, pros and cons of continuous PNB (cPNB) were compared to single shot PNB (sPNB). Although, cPNB highlights the major limitation of sPNB in terms of short duration of analgesia and need for larger volume or higher concentrations of local anaesthetics, thereby, increasing the risk of local anaesthetic systemic toxicity, but cPNB has its own share of drawbacks like higher cost, catheter dislodgement, obstruction and leakage at the catheter site and risk of bacterial colonisation at epidural site. Also, they stated that there were many patients for whom cPNB was not appropriate in view of their comorbidites or unwillingness to participate. [21]

An anatomic study by Short and Baig evaluated the innervation of anterior hip capsule from which majority of pain arises. This study also identified relations of high branches of FN and ON to bony landmarks. The anterior capsule of hip joint is consistently supplied by three nerves- Femoral Nerve, Accessory Obturator Nerve (AON), Obturator Nerve. Branches of both FN and ON contribute to 100% innervation whereas AON contributes to 54% innervation of the hip capsule. The articular branches from the FN to the hip joint enter the iliacus muscle at the L4–L5 level and course deep to the psoas muscle and tendon between the Anterior Inferior Iliac Spine (AIIS) and Iliopubic Eminence before innervating the hip capsule. The AON courses deep to the medial aspect of psoas muscle around the L5

level and then courses deep to the psoas around Iliopubic Eminence to enter the anteromedial joint capsule. [22] High articular branches of FN (arising above the inguinal ligament) supply all four quadrants of hip joint capsule. Also, obturator nerve has high branches which are branches given proximally in the obturator canal. This therefore explains modest effect of FNB and 3 in 1 block on pain in hip fractures. [23]

In another study by Gardner E et al [24] the nerve supply of the human hip joint was studied in dissections of adult joints and in serial sections of foetal joints. They reported that articular nerves to hip arise from the femoral, obturator and superior gluteal nerves, nerve to the quadratus femoris, AON and possibly from the branches of lumbar sympathetic ganglia.

An anatomical study by Birnbaum K et al [25] revealed that there exists a separation between anterior and posterior sensory innervation of the hip joint capsule. They described branches from FN innervating anterior and anterolateral region of hip capsule, ON supplying antero-medially, superior gluteal nerve innervating posterolateral anatomy, articular branches from sciatic nerve and nerve to quadratus femoris supplying posterior region of hip capsule. [25]

A.P. Winnie et al in 1973 conducted a study titled “The Inguinal Paravascular Technic of Lumbar Plexus Anesthesia: The “3 -in - 1 Block “. They described the inguinal paravascular technique for lumbar plexus blockade, the so-called “3-in-1 block” and concluded that with a “3-in-1 block” only the femoral and lateral cutaneous nerves can be reliably blocked, whereas the ON is often spared. [12]

Dalen et al in 1989 conducted a study to evaluate the efficacy and reliability of a new anterior approach of lumbar plexus block called the FICB. The “fascia iliaca compartment,” is triangular in shape where

femoral, lateral cutaneous femoral and obturator nerves run for a considerable part of their courses and has boundaries as follows

1) anteriorly, the inner aspect of the fascia iliaca, which covers the iliacus muscle and reflects medially, thus covering the dorsal, lateral, ventral, and then medial aspects of the psoas muscle;

2) posteriorly, the outer aspect of the iliacus muscle;

3) medially, the vertebral column and the upper part of the sacrum; and

4) rostrally and laterally, the inner lip of the iliac crest to which the fascia is tightly attached

They compared it with 3 in 1 block procedure in 120 pediatric patients undergoing lower limb surgeries. The new approach i.e. FICB was a '2-pop' technique where the first pop was identified when the needle crossed the fascia lata and the second pop when it crossed fascia iliaca. Both blocks were given using landmark technique with anaesthetic solution consisting of 1% Lidocaine with 0.5% bupivacaine both with 1:200,000 epinephrines. In this study they found that the group that received FICB had more adequate analgesia and high degree of sensory blockade of lumbar plexus nerves that supply the thigh using reasonable amounts of local anaesthetic compared to the 3 in 1 block. [13]

Capdevila X et al also compared the 3-in-1 and FICB in 100 adults both clinically and radiologically and found out that both the blocks provide effective postoperative analgesia in adults. However, the FICB technique results in faster and more consistent sensory blockade of the LFCN and sensory block is mainly due to the spread of local anaesthetic solution under the fascia iliaca and rarely to the lumbar plexus. [26]

This was also supported by a study published in 2019 whereby the anatomy of fascia iliaca compartment and its relation with femoral nerve,

LFCN and obturator nerve was described in depth. N. O'Reilly stated that distally, the fascia iliaca invests the FN and passes posterior to the femoral artery and vein which lie within the lacuna vasorum. [27] The FN arises from the second to fourth lumbar nerve roots and descends through the fibres of psoas major before passing distally between the psoas and iliacus muscles. It then exits the pelvis to lie anterior to iliopsoas and lateral to the femoral vessels. The LCNT is a purely sensory nerve which arises from the second and third lumbar nerve roots and passes deep to the fascia iliaca before leaving the fascial plane around the level of the inguinal ligament. The ON arises from the second to fourth lumbar roots, is predominantly a motor nerve, and inconsistently innervates a proportion of the skin of the medial thigh. [28] After penetrating the fascia and leaving the fascia iliaca compartment, the ON passes posterior to the common iliac artery before reaching the obturator foramen. All of these nerves lie within the fascia iliaca compartment at the proximal end of their anatomical course, and therefore placement of LA beneath the fascia iliaca results in anaesthesia of FN, ON, and LCNT. The genitofemoral nerve runs on the anterior aspect of the psoas muscle posterior to the fascia iliaca and therefore, the FICB may also result in anaesthesia of the genitofemoral nerve.

In 2007, Stevens tried to bring out a modified version of landmark guided FICB described by Dalens. In this study the technique involved advancement of needle through the skin at a right angle 1 cm above the Inguinal Ligament (IL), as compared to 0.5 cm caudal of the IL in the classic Dalens' approach. He hypothesised that injecting 40 mL of LA above the IL allowed the LA to block the lumbar plexus at a higher level. Hence, he concluded that there was a significant reduction in morphine consumption at 24 hours (37 mg vs 22 mg) when this technique was compared to a sham block. [3]

With the introduction of ultrasound (US), the fascia iliaca can be visualised, enabling a more accurate positioning of the needle and better deposition of local anaesthesia below the fascia iliaca. Dolan (2008) was the first to describe the FICB using ultrasound. [17]

Dolan et al (2008) compared efficacy of FICB performed by loss of resistance technique and ultrasound (US) guided technique. The study was conducted on 80 patients undergoing hip or knee surgery receiving FICB with 30 mL of LA, by either loss of resistance (double pop) or US guidance. In the US group, US were used in the procedure to identify the Fascia iliaca (FI) and to guide the needle to the correct plane in transverse axis view. They noted the flow of LA in a medial and lateral direction under the FI. They found out that ultrasound guided FICB [FIG 1] increased the frequency of sensory loss in medial aspect of thigh along with increased frequency of femoral and obturator nerve motor block [17].

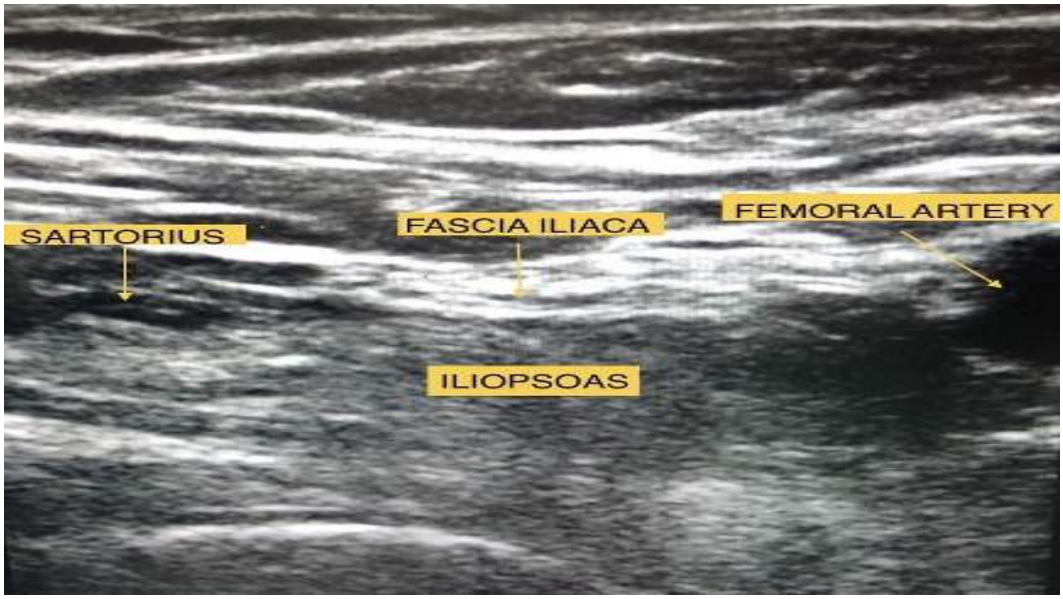


FIG 1 : IMAGE SHOWING SONOANATOMY OF INFRAINGUINAL FICB

Hebbard et al (2011) developed a new ultrasound guided supra-inguinal approach. He performed more than 150 blocks using this technique and also conducted a study on 6 unembalmed human cadavers by

administering ultrasound guided suprainguinal FICB. He hypothesised that it may be more advantageous to inject the LA above the IL in the FI compartment, because the LFCN leaves the FI plane at the IL, and branches of the FN to the iliacus muscle and acetabulum leave proximal to the IL. [16] Hebbard positioned the US probe perpendicular over the IL, close to the Anterior Superioir Iliac Spine (ASIS), in the para-sagittal plane (cranio- caudal orientation). This probe position gave a better view of the FI, sartorius muscle, iliopsoas muscle (IPM) and abdominal internal oblique muscles [FIG 2] the probe was then moved inferiorly and medially, along the IL. It was carefully ensured that the probe was always lateral to the femoral artery and nerve. They introduced the needle in plane 2-4 cm inferior to the IL and advanced the needle at the level of the IL through the FI. 1mL of LA was injected, that formed a lens deep to the FI. The needle was advanced into this lens and further LA was injected by the process of hydro-dissection, the needle could be passed cranially, deep into the FI compartment and towards the iliac fossa. [2] An injection was considered successful when there was a good cranial spread of LA under the FI. 20 mL of LA blocked both the FN and the LFCN in 150 patients. This was confirmed in 6 cadavers in which 12 suprainguinal FICB was performed with 20 mL aniline blue. The FN was stained with the contrast in all cases, the LFCN in 10 out of 12 cases and the ilioinguinal nerve in 7 out of 12 cases but the study was limited in examining the involvement of the ON.

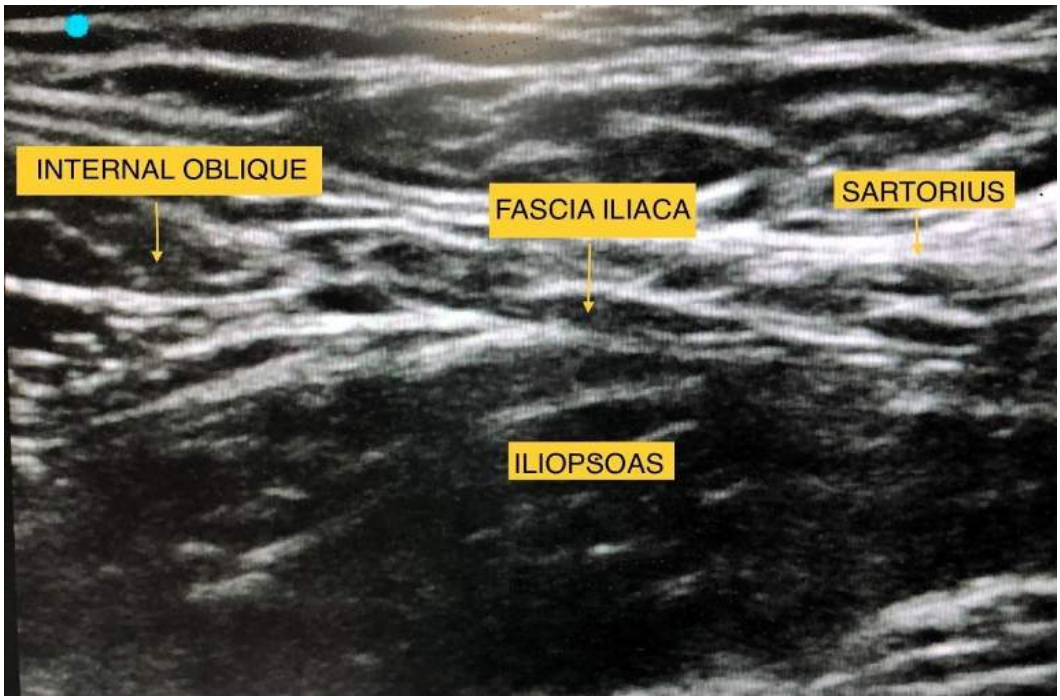


FIG 2 : IMAGE SHOWING SONOANATOMY OF SUPRAINGUINAL FICB

Desmet et al [29] studied the efficacy of supra-inguinal fascia iliaca compartment block for analgesia after total hip arthroplasty. They randomly divided 88 patients into a control group and a group receiving a suprainguinal FICB with 40 mL ropivacaine 0.5%. A slight modification of Hebbard's technique was made by rotating the US probe in line with the umbilicus so that a "bow-tie-sign" could be identified which was formed by the fascia of the iliacus muscle, the Sartorius muscle and the muscles of the abdominal wall. The needle perforated the fascia iliaca 1 cm above the IL and 40 mL of LA was injected. Hebbard et al named his approach suprainguinal but the fascia iliaca compairtment was entered below the IL unlike the new approach introduced by Desmet. Desmet demonstrated a reduction in morphine consumption of 45% at 24 and 48 hours, and lower pain scores postoperatively in the suprainguinal FICB group. This study also focused on the sensory block of the ON and showed that sensory blockade of ON in 86% of the patients. In 70% of the patients, the 3 target nerves (FN, LFCN and ON) were blocked. They hypothesised that

injecting a high volume of LA more proximally in the fascia iliaca compartment results in a more successful block of the target nerves.

Kumar et al in 2015 conducted a study comparing the conventional infrainguinal and modified proximal suprainguinal approach of Fascia Iliaca Compartment Block for postoperative analgesia. The study was conducted on 40 patients scheduled for total hip arthroplasty and were randomized into group S (who received FICB by suprainguinal approach) or group I (who received FICB by infrainguinal approach). Group I patients received FICB by the conventional infrainguinal approach described originally by dalens “The classical landmark guided loss of resistance technique”. In this technique, the block needle was placed at a point 1 cm below the junction of middle and outer third of line joining the pubic tubercle and the anterior superior iliac spine (ASIS) and then advanced through the skin at right angle until first pop or loss of resistance was felt (while traversing fascia lata). The needle was then further advanced till second pop was felt (while traversing fascia iliaca). 40 mL of solution containing 0.2% bupivacaine was injected after a negative aspiration test while maintaining a firm compression immediately below the site of injection. Group S patients received FICB by modified suprainguinal approach described by stevens which was also “landmark based loss of resistance technique”. This technique was similar to the conventional technique described above except the point of placement of needle was 1 cm above the junction of middle and lateral third of line joining the pubic tubercle and the ASIS. Here, the needle was advanced through the skin at right angles until first pop or loss of resistance was felt (while traversing the superficial fascia of abdominal wall). The needle was then further advanced until a second pop was felt (while traversing fascia transversalis). 40 mL of solution containing 0.2% bupivacaine was injected after a negative aspiration test. They found out that morphine consumption in postoperative period was significantly less in group S as compared to group I at 6, 12 and 24 hours post block ($p < 0.05$). Also, cumulative 24

hour morphine consumption was significantly lower in group S as compared to group I ($p < 0.0001$). The first utilization of PCA morphine i.e. first analgesic demand was delayed in group S as compared to group I ($p < 0.0001$). The PCA demand frequency was significantly lesser in patients of group S as compared to group I. [30]

Hards et al in 2018 conducted a metanalysis in which seven studies involving 699 patients were included. They studied the Efficacy of Prehospital Analgesia with Fascia Iliaca Compartment Block for Femoral Bone Fractures and found that Out of a total of 254 prehospital FICBs, there was a success rate of 90% and only one adverse effect reported. They concluded that the FICB is suitable for use in the prehospital environment for the management of femoral fractures and it is a useful analgesic technique but they suggested that further research is required to investigate its effectiveness compared to systemic opioids. [31]

Kris et al in 2019 conducted a volunteer study on 10 healthy individuals to prove that Supra-inguinal injection for fascia iliaca compartment block results in more consistent spread towards the lumbar plexus than a infra-inguinal injection. Both infrainguinal and suprainguinal FICB were given on left and right side of each volunteer using 40 ml of 0.5% lidocaine. They found that after suprainguinal FICB 80% of the volunteers had a complete sensory block of the medial, anterior and lateral region of the thigh compared with 30 % after infrainguinal FICB. They concluded that suprainguinal FICB produces more complete sensory block of the medial, anterior and lateral region of the thigh compared with infrainguinal FICB. [32]

In 2020,Wan et al [33] published a study named “Fascia Iliaca Compartment Block for Perioperative Pain Management of Geriatric Patients with Hip Fractures: A Systematic Review of Randomized Controlled Trials” in which they included a total of 27 RCTs with 2478

cases and aimed to summarise the benefits of FICB in perioperative period. They concluded that FICB can provide patients with equal or even better pain relief compared with the conventional analgesia methods after admission or in the emergency department which can also reduce additional analgesic consumptions. While intraoperatively, before positioning for spinal anesthesia (SA), FICB facilitates SA performance and is able to offer superior pain control. Postoperatively, FICB can effectively alleviate pain with decreased use of additional analgesics thereby promoting earlier mobilization and preventing complications.

Mustafa Azizoğlu conducted a retrospective study comparing the postoperative analgesic efficacy of single shot ultrasound guided suprainguinal FICB and epidural analgesia (EA) after major hip surgery. 150 patients who underwent major hip surgeries and who received suprainguinal FICB or EA were examined retrospectively. 78 patients who received suprainguinal FICB and 72 patients who received EA were included and their medical records were reviewed retrospectively. Morphine consumptions, VAS scores, and side effects were recorded. Single-shot suprainguinal FICB provided similar postoperative pain control as compared to EA in the first 18 hours after hip surgery. However, Visual Analogue Scale (VAS) scores were higher in the suprainguinal FICB group than EA group after the 18th hour. There was no significant difference between the two groups according to total opioid consumption in the first 48 hours. Hypotension was seen more frequently in patients receiving EA. [34]

Lin et al published a study aimed at investigating the effects of ultrasound-guided fascia iliaca compartment block (FICB) in patients receiving femoral shaft fracture fixation. 118 patients with femur fractures were enrolled and were randomly divided into 2 groups. After intravenous anesthesia induction with propofol, fentanyl and cisatracurium, and laryngeal mask airway insertion, monitoring of non- invasive blood

pressure (NIBP), heart rate (HR), pulse oximetry (SpO2) and electrocardiogram (ECG) were performed with continuous oxygenation, 59 patients received FICB and 59 received Combined Spinal Epidural Analgesia (CSEA). Degree of pain before surgery (T1), and at 30 min (T2) and 1 h (T3) after analgesia was evaluated using the VAS with a total score of 10 points and a higher score representing more severe pain. Surgical risk indicators included mean arterial pressure (MAP) and heart rate (HR). Preoperative and postoperative emotional effects were assessed using the Self-rating Anxiety Scale (SAS) and the Self- rating Depression Scale (SDS). At T2 and T3 mean VAS score in the FICB group were significantly lower than the mean score in the CSEA group ($P<0.050$), ($P<0.050$) respectively. At T2, mean MAP in the FICB group was 90.68±9.12 mmHg significantly lower than the mean MAP of 97.53± 10.62 mmHg recorded in the CSEA group ($P< 0.050$). Differences in HR at T1, T2, and T3 between the two groups showed no statistical signifi-cance ($P>0.050$). After surgery, the SDS and SAS scores in FICB group were significantly lower than those in CSEA group ($P<0.001$), ($P=0.003$). Hence, Lin concluded that application of ultrasound- guided FICB block in femoral shaft fracture fixation provides promising analgesic efficacy while effectively sustaining the stability of vital signs. [35]

Aliste J et al conducted a randomized control trial comparing Pericapsular Nerve Group (PENG) block and supra-inguinal FICB for THA. Incidence of quadriceps motor block was considered as primary outcome. Total of 40 patients receiving spinal anaesthesia were randomly allocated to receive either PENG or suprainguinal FICB using 20 mL of 0.5% levobupivacaine and 40 mL of 0.25% levobupivacaine respectively. Pain scores at 3, 6, 12, 18, 24, 36, and 48 hours, breakthrough morphine consumption at 24 and 48 hours, opioid-related side effects, ability to perform physiotherapy at 24 and 48 hours and length of stay were observed during the performance of block. Along with it, sensory and motor assessment was performed at 3, 6, and 24 hours. Thereby, they concluded that compared to supra-inguinal

FICB, PENG resulted in significantly lower incidence of quadriceps motor block at 3 and 6 hours with better preservation of hip adduction at 3 hours and decreased sensory block of the anterior, lateral, and medial thighs at all measurement intervals. However, no clinically significant differences in terms of postoperative pain scores, cumulative opioid consumption at 24 and 48 hours, ability to perform physiotherapy, opioid-related side effects, and length of hospital stay were observed. Therefore they summarized that PENG results in better motor sparing than suprainguinal FICB. [36] But the findings of another study conducted by Yong Seon Choi were contrary to this study. He found out that there was no significant difference in the quadriceps strength between the patients receiving two blocks and also between operative leg and the non operative leg. The analgesic efficacy of PENG block was statistically similar to that FICB. [37]

Recently , a study was published which was conducted was Dubey et al to compare two approaches (parallel versus perpendicular) of ultrasound (US) guided FICB in patients undergoing proximal femur fracture surgeries. Primary objective was to compare the time to do ultrasonic imaging, time to perform the FICB, and total block time and the secondary objective was to compare the time to loss of sensation, first rescue analgesia, pain score and occurrence of adverse events. 51 patients were allocated into two groups in this prospective observational study. In parallel group (Group A) (n = 25), the USG probe was kept parallel to the inguinal ligament, and in the perpendicular group (Group B) (n = 26), a probe was placed perpendicular to the inguinal ligament. Both groups received the same dose of 40 ml of 0.375% ropivacaine 30 min before the administration of the subarachnoid block. They concluded that USG-guided FICB given in either approach before SA would ensure patient comfort during positioning for SA and also provide good post-operative analgesia without haemodynamic instability. Though the parallel approach took lesser time to locate the ultrasonic imaging and performance of the

block, the perpendicular approach of US guided FICB has a better block effect as compared to the parallel method. [38]

Regarding the local anaesthetic agent of choice and its volume required many studies have been conducted and one of these is a study conducted by Gupta N et al in 2017 compared the efficacy of 0.25% Levobupivacaine and 0.25% Ropivacaine in FICB in elderly patients with fracture femur given before positioning for subarachnoid block. A total of 60 patients were taken who randomly received either 30 ml of 0.25% Levobupivacaine or 30 ml of 0.25% Ropivacaine in FICB. They concluded that both the drugs had comparative efficacy and duration of analgesia [39] but since, Ropivacaine is preferred over levobupivacaine because it is more cost effective and more easily available.

Various studies were aimed to find out the ideal dose of 0.2%ropivacaine and in a cadaveric study by Kris Vermeylen, [40] it was found that almost 40 ml volume was required to block femoral, lateral cutaneous femoral nerve and obturator nerve while 20-30 ml was enough to block femoral and lateral cutaneous femoral nerve. Still research and further studies are needed to find out the appropriate dose of local anesthetic agent required to achieve an ideal block.

Taken together, these studies suggest that, FICB is an effective post-operative analgesia for hip and thigh surgeries as it has reported ability to block the femoral, lateral cutaneous femoral and obturator nerve at the same time thereby decreasing pain, enhancing post- operative mobilization due to minimal motor block and minimizing the use of opioids in post-operative period leading to improved outcomes. Since there are very few studies comparing the analgesic efficacy of ultrasound guided supra-inguinal and infra-inguinal approaches of FICB , we propose to compare the efficacy of ultra sound guided suprainguinal approach of

FICB with that of infrainguinal approach of FICB for postoperative pain relief in above knee lower limb orthopaedic surgeries.

MATERIALS AND METHODS

SOURCE OF DATA

A randomized double blind observational study has been conducted in the department of Anaesthesiology, Dayanand Medical College &Hospital, Ludhiana after approval by Institutional Ethics Committee on a total of 50 adult patients undergoing above knee lower limb surgeries under subarachnoid block who were randomly allocated to either of the 2 study groups of 25 patients each by computer generated randomization codes contained in sealed, sequentially numbered envelopes. A written informed consent was obtained from each patient.

METHOD OF COLLECTION OF DATA

INCLUSION CRITERIA

- ASAI, II& III patients above 18 years of age.
- Patients scheduled for above knee lower limb orthopaedic surgeries i.e. Hip Hemiarthroplasty, Proximal femur nailing, distal femur nailing, above knee amputation,
- Cognitive ability to comprehend and understand NRS scale.

EXCLUSION CRITERIA

- ASA IV patients
- Coagulopathy
- Infection at injection site
- Allergy to local anaesthetic drugs
- Patients receiving General anaesthesia / Epidural blockfor Lower Limb surgeries
- Diabetic neuropathy& other neurological deficits in lower limb.
- Patients on chronic opioid abuse or use of opioids for chronic analgesia

GROUP ALLOCATION

A total of 50 patients were recruited for the study and were allocated randomly using computer generated random number list to either of the 2 groups. All patients were randomized into two groups, group S and group I.

All patients in both groups received a standard anaesthesia technique of subarachnoid block in sitting position under all aseptic conditions. Then the patients were placed in supine position and they received ultrasound guided FICB by different approaches according to their allocated groups.

GROUP S

Comprising of 25 patients who received local anaesthetic solution of 30 mL of 0.2% ropivacaine using ultrasound guided suprainguinal approach

GROUP I

Comprising of 25 patients who received local anaesthetic solution of 30 mL of 0.2% ropivacaine using ultrasound guided infrainguinal approach

The randomization scheme using computer generated random number was prepared by the biostatistician and those involved in the study were unaware of the group allocation. The allocation envelope was opened by an anaesthesiologist who was not involved with the direct clinical care of the patient and the same anaesthesiologist will administer the block according to the random allocation sequence. A blinded observer assessed the postoperative pain scores and 24-hour opioid consumption. This observer was not involved in the direct clinical care of the patient. These codes were decoded at the end of study period.

PREANAESTHETIC CHECKUP

Routine thorough preanaesthetic check-up was conducted comprising of detailed history, comorbidities, allergy to any drug being used, general physical and systemic examination. Patients were explained about the study being conducted and written informed consents were taken and also educated on the use of NRS scale. Relevant investigations were sent and reviewed. Demographic information including BMI, age and sex, type of lower limb surgery were recorded. Oral premedication in the form of pantoprazole 40 mg and alprazolam 0.25 mg were given on the morning of surgery with sip of water.

ANAESTHESIA TECHNIQUE

On arrival in the Operating Room, patients were positioned on the operating table in the supine position and routine monitoring in the form of 5-lead electrocardiography, non-invasive blood pressure (NIBP), temperature and pulse oximeter will be instituted. Heart rate (HR) were recorded using 5 lead electrocardiography and non-invasive blood pressure (NIBP) using an automated non-invasive device that was recycled every 1 min until three consecutive measurements of systolic blood pressure (SBP) , diastolic blood pressure (DBP) and mean arterial pressure (MAP) were recorded and mean of three readings were recorded as baseline.

All patients in both groups received a standard anaesthesia technique of subarachnoid block with 3 ml anaesthetic solution constituting of 2.5 ml hyperbaric 0.5% bupivacaine with 0.5 ml of 25 mcg fentanyl in sitting position under all aseptic conditions. The adequacy of spinal block was assessed by level of sensory block and motor block (using Modified Bromage Scale). [41] Then the patients of both groups were placed in supine position and they received ultrasound guided FICB by different approaches according to their allocated groups.

Group S patients received FICB using ultrasound guided suprainguinal approach with a high frequency (6-14Mhz) linear probe in the supine position. Initially, the anterior superior iliac spine (ASIS) was palpated. The transducer was placed in the inguinal crease to identify the femoral artery in the short axis. From the femoral artery, the transducer was translated laterally to identify the sartorius muscle. The sartorius was traced cephalad to its insertion on the anterior superior iliac spine. Using this technique, the hypoechoic shadow of the anterior superior iliac spine is easily identifiable just cephalad to the insertion of the sartorius. Medial to the shadow of the anterior superior iliac spine lies the iliacus muscle. With the anterior superior iliac spine and iliacus identified, the medial end of the transducer was rotated to point at the umbilicus, which is the final transducer position. With the transducer in the final position, sonographic anatomy was identified, from superficial to deep, consisting of subcutaneous fat, tensor fascia lata, the internal oblique muscle (cephalad),the sartorius muscle (caudal) ,the fascia iliaca overlying the iliacus muscle, and the iliacus muscle itself. A 21-gauge, 100-mm block needle (Stimuplex; B. Braun, Bethlehem, PA) was advanced in-plane fashion from caudal to cephalad end to puncture the fascia iliaca. With the needle tip just below the fascia iliaca, 2 mL of a local anaesthetic was injected to confirm the tip location. Once the proper position was confirmed, 30 mL of 0.2% ropivacaine was incrementally injected superficial to the iliacus muscle and deep to the fascia iliaca. After completion of the injection, the transducer was translated medially towards the femoral nerve, where caudomedial spreading of the local anaesthetic was easily identified. [27]

Group I patients received FICB by ultrasound guided Infrainguinal approach. In the supine position as before, a high frequency (6-14Mhz) linear probe was placed transversely to identify the femoral artery at the inguinal crease. The iliopsoas muscle with the overlying fascia iliaca was identified and the hyperechoic Femoral Nerve is typically seen lying

between the iliopsoas and fascia iliaca at a depth of 2-4 cm, lateral to the femoral artery. The probe was tilted cranially and caudally until optimal images of the Femoral Nerve and fascia iliaca were obtained. The triangular shaped sartorius muscle and the anterior superior iliac spine (ASIS) were identified on moving the probe laterally. After skin disinfection and local anaesthetic (LA) infiltration, a 21-gauge, 100-mm block needle (Stimuplex; B. Braun, Bethlehem, PA) was inserted using an in-plane technique with the aim of placing the needle tip beneath the fascia iliaca around the lateral third of a line between the ASIS and pubic tubercle. Aspiration was performed before injection of 2 ml Local Anaesthetic. Once the proper position was confirmed, 30 mL of 0.2% ropivacaine was incrementally injected. Correct needle placement was confirmed by separation of the fascia iliaca from the iliopsoas muscle with Local Anaesthetic spreading towards the Femoral Nerve medially and the iliac crest laterally. [31]

Both the patient and the observer were blinded to the nature of FICB approach being used.

FOLLOWING OUTCOMES WILL BE OBSERVED POSTOPERATIVELY

PRIMARY OUTCOME

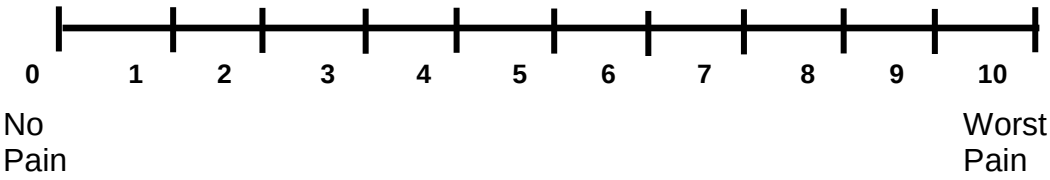
To compare the efficacy of ultra sound guided suprainguinal approach of FICB with that of infrainguinal approach of FICB for postoperative pain relief for above knee lower limb orthopedic surgeries . This was evaluated by -

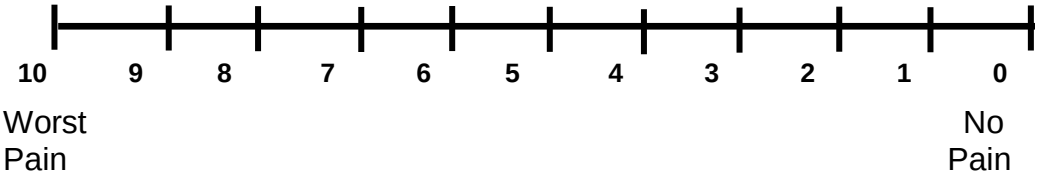
- Comparative consumption of total amount of analgesic in 24 hour period among both groups.

SECONDARY OUTCOMES:

- Numerical rating scale (NRS) was recorded every hour for 24 hours where the time zero was time of initiation of block.

The score was determined by asking the patient to rate the pain from 0-10, where in 0 being the least pain and 10 being the maximum.

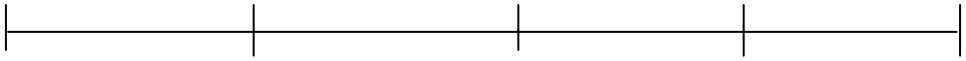




- Duration of analgesia- Duration of analgesia was defined as the time from initiation of block to the time of first requirement of rescue analgesic at NRS ≥4

  Injection paracetamol was given to the patients every 8 hourly and Injection tramadol 50mg intravenous was used as rescue analgesic whenever the NRS **≥** 4 to a maximum of 150 mg within 24 hours. Injection Ondansetron 4 mg i/v was given along with injection Tramadol.
- Post operative nausea and vomiting

- Patient satisfaction score for pain management was measured by asking the patient to rate their satisfaction on a 5-point Likert scale 24 hours after surgery.



Very satisfied **satisfied** **neither satisfied nor dissatisfied** **dissatisfied** **very dissatisfied**

STATISTICAL ANALYSIS

Data was described in terms of range; mean ±standard deviation (± SD), frequencies (number of cases) and relative frequencies (percentages) as appropriate. Comparison of quantitative variables between the study groups was done using Student t-test and Mann Whitney U test for independent samples for parametric and non- parametric data respectively. For comparing categorical data, Chi square ($\chi 2$) test was performed and Fisher's exact test was used when the expected frequency was less than 5. A probability value (p value) less than 0.05 was considered statistically significant. All statistical calculations were done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows.

SAMPLE SIZE CALCULATION

A post hoc power analysis was conducted using the software package, G*Power version 3.1.9.2 (Franz Faul, university kiel, Germany). The alpha level used for this analysis was $p<0.05$ and beta was 0.20. Sample size was estimated from the results of previous study [30] using the Morphine consumption as the parameter, which is the primary outcome of our study. Our sample size came out to be 25 subjects per group at power of 0.99 and with an effect size of 1.62 with 10% chance of error with $\alpha = 0.05$, $\beta = 0.20$ and confidence interval of 95%.

OBSERVATION & RESULTS

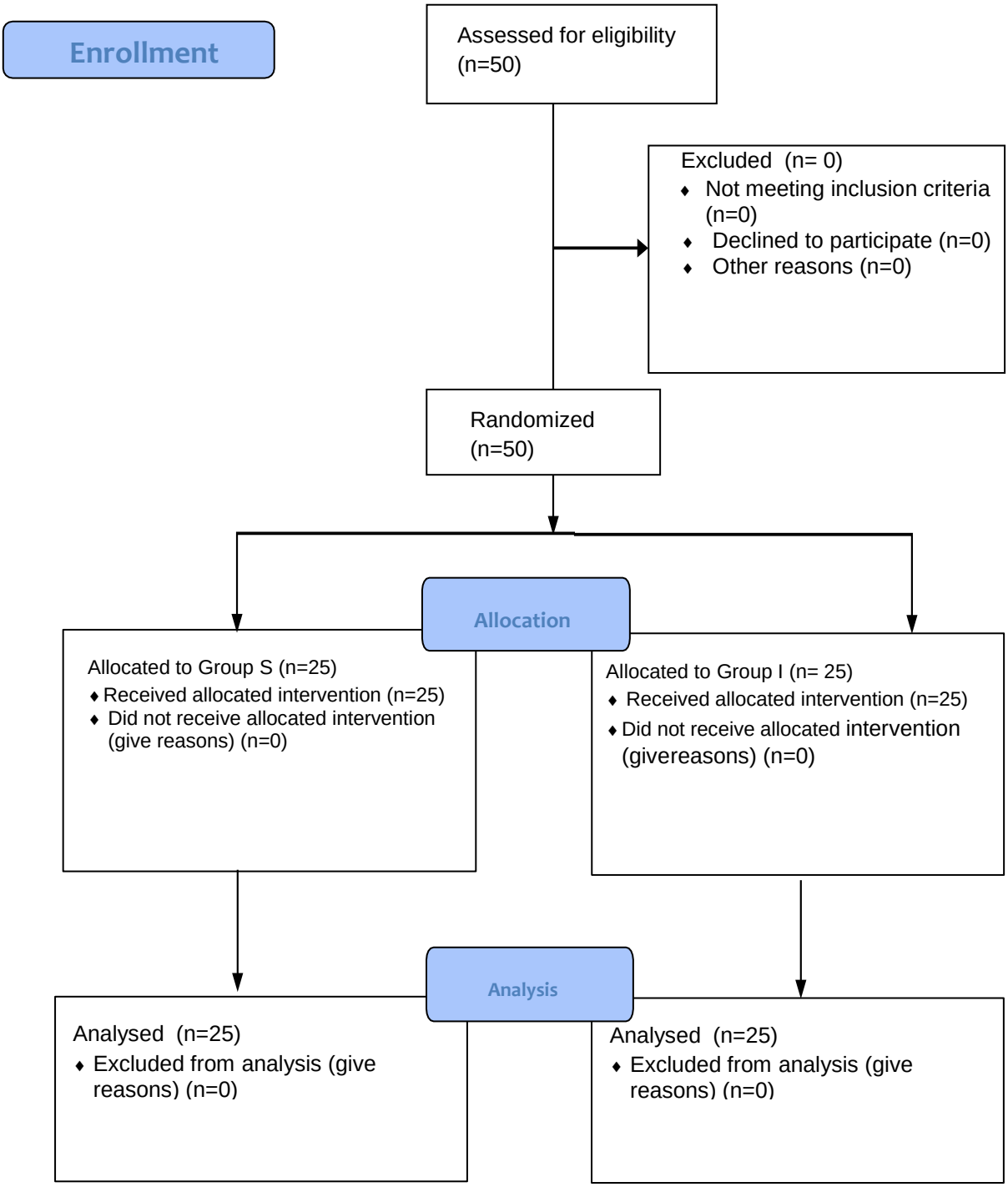
The present randomized control study was conducted in a prospective manner in the department of Anesthesiology, DMCH Ludhiana on a total of 50 patients scheduled for above knee orthopedic surgeries under spinal anaesthesia belonging to ASA grade I, II& III.

The study aimed to compare the suprainguinal approach of fascia iliaca compartment block (FICB) with the infrainguinal approach for post operative analgesia in patients undergoing above knee orthopedic surgeries.

The following outcomes were noted:

- Comparative consumption of total amount of analgesic in 24 hour period among both groups.
- Assessment of pain using Numerical rating scale (NRS) starting at hour zero (0 ; initiation of block) every hourly till 24 hours
- Duration of analgesia
- Post operative nausea and vomiting
- Patient satisfaction score for pain management

Figure 3: CONSORT Flow Diagram of the study



A total of 50 patients were enrolled for the study and all of them completed the study. They were divided in 2 groups of 25 patients each and were randomly allocated to either of the groups by computer generated random numbers. All of them received the interventions and there were no dropouts. They were analyzed using SPSS 21 version statistical program for Microsoft Windows.

Table 1: DEMOGRAPHIC PROFILE: DISTRIBUTION OF SUBJECTS ACCORDING TO AGE, GENDER, HEIGHT, WEIGHT AND BMI

	Group S		**Group I**		t	p-value
	Mean	SD	Mean	SD		
Age	65.25	19.21	70.24	12.93	-1.071	0.290

		Group S		**Group I**		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
Gender	Female	11	44%	15	60%	26	1.2825	0.258
	Male	14	56%	10	40%	24		
Total		25	100%	25	100%	50		

	Group S		**Group I**		t	p-value
	Mean	SD	Mean	SD		
Height	164.72	8.00	162.64	8.44	0.894	0.376
Weight	71.64	8.25	70.88	7.62	0.338	0.737
BMI	26.44	2.84	26.77	1.63	-0.501	0.618

Both the groups were statistically comparable in respect to the demographic data. Mean age in group S was 65.25 ± 19.21 years and in group I it was 70.24 ± 12.93 years. Mean height in Group S was 164.72 ± 8.00 cm and in group I it was 164.97±7.47cm and the mean weight were 71.64 ± 8.25 kgs and 74.48 ± 8.20 kgs in group S and I respectively. Mean BMI being 26.04 ± 2.45 kg/m2 and 27.96 ± 2.63 kg/m2 in group S and I respectively.

In group S 56% of the patients were males and in group B 40 % were males. The distribution of subjects across both groups was comparable.

FIGURE 4a: DISTRIBUTION OF SUBJECTS ACCORDING TO AGE

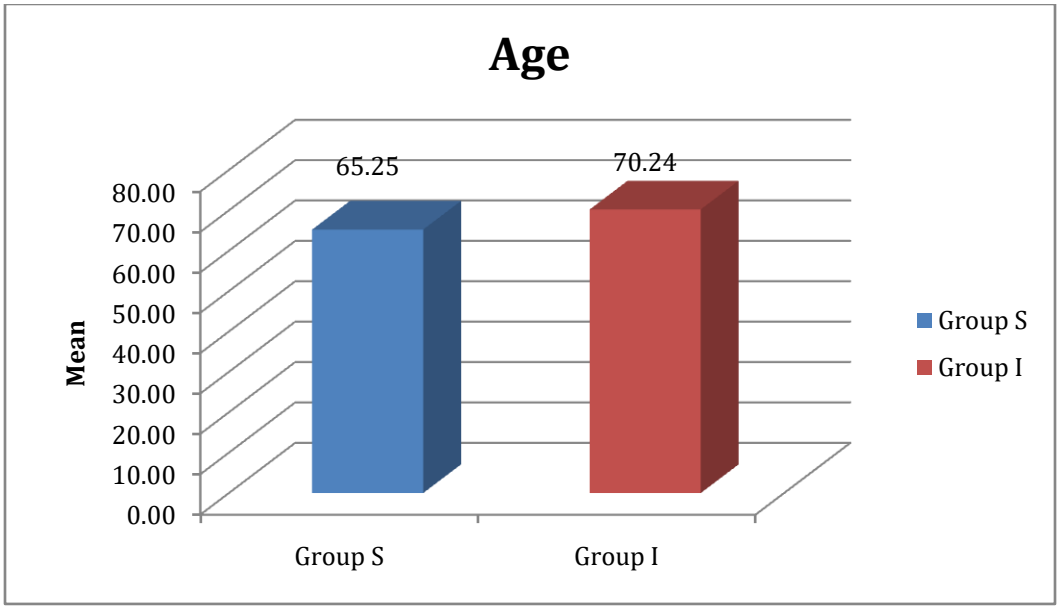


FIGURE 4b: DISTRIBUTION OF SUBJECTS ACCORDING TO GENDER

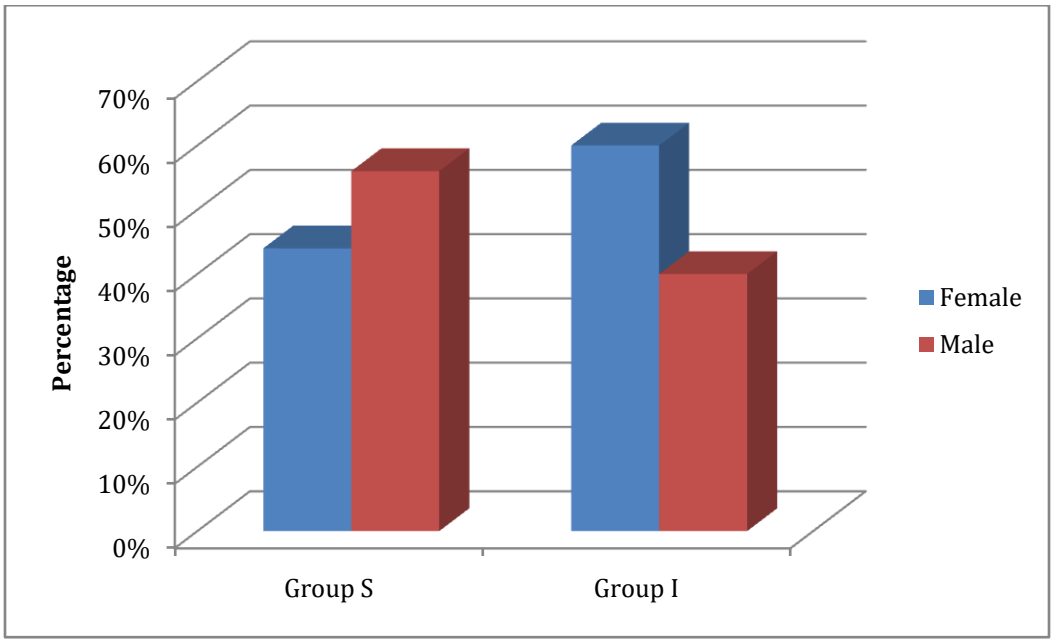


FIGURE 4c: DISTRIBUTION OF SUBJECTS ACCORDING TO HEIGHT

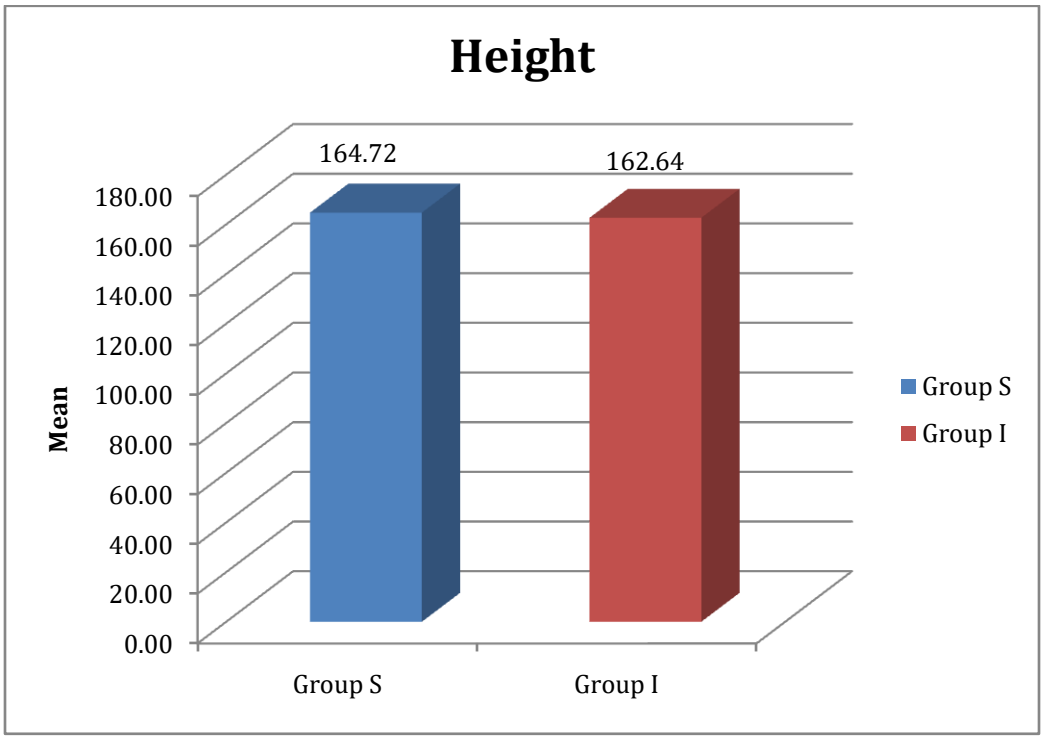


FIGURE 4d: DISTRIBUTION OF SUBJECTS ACCORDING TO WEIGHT

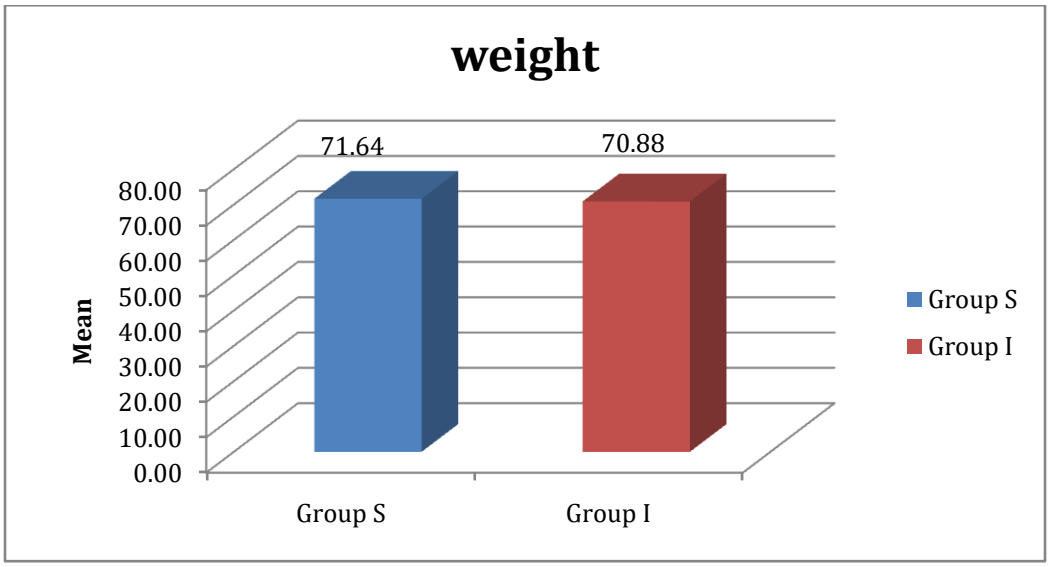


FIGURE 4e: DISTRIBUTION OF SUBJECTS ACCORDING TO BMI

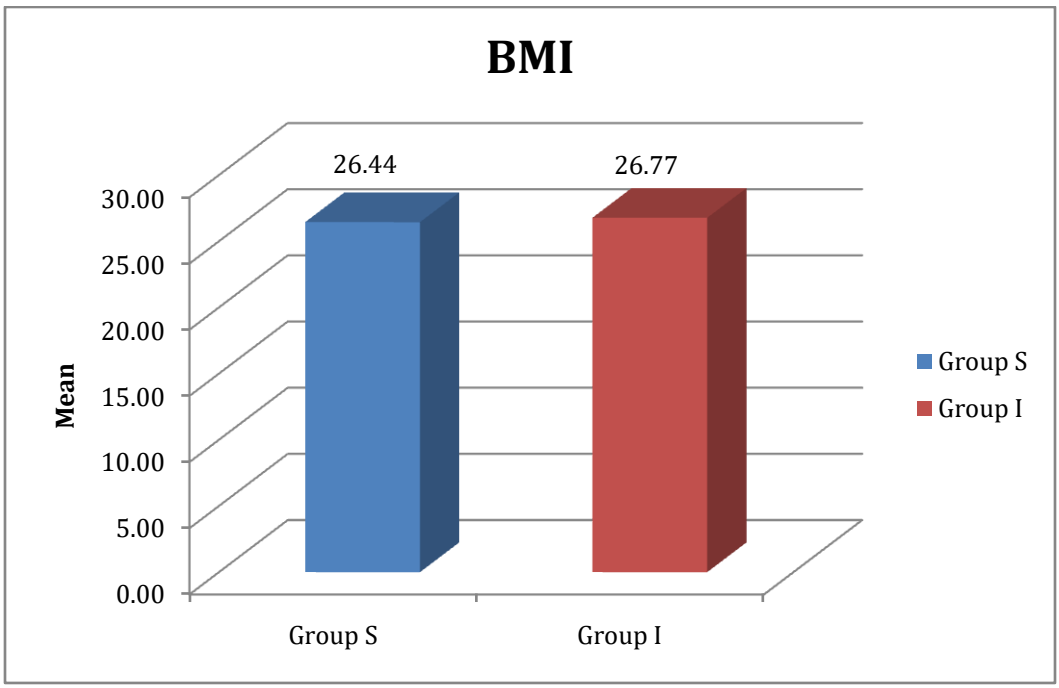


TABLE 2: DISTRIBUTION OF SUBJECTS ACCORDING TO ASA GRADE

		Group S		Group I		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
ASA grade	1	2	8%	1	4%	3	0.360	0.835
	2	5	20%	5	20%	10		
	3	18	72%	19	76%	37		
Total		25	100%	25	100%	50		

In group S, 8% patients belonged to ASA I, 20% belonged to ASA II, and 72% belonged to ASA III. In group I, 4% patients belonged to ASA I, 20% belonged to ASA II, and 76% belonged to ASA III. Both the groups were statistically comparable.

FIGURE 5: DISTRIBUTION OF SUBJECTS ACCORDING TO ASA GRADE

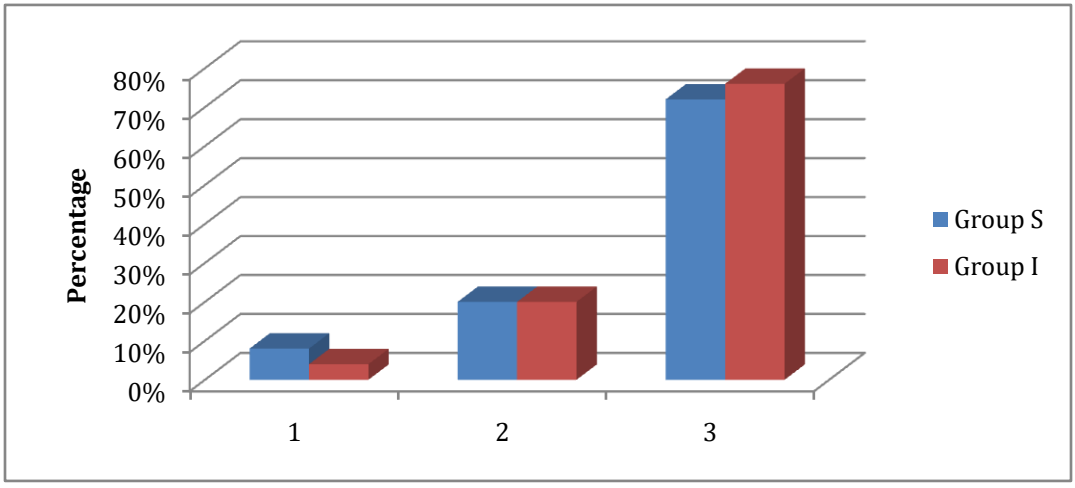


TABLE 3: DISTRIBUTION OF SUBJECTS ACCORDING TO TYPE OF HIP SURGERY

		Group S		Group I		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
Type of Lower Limb surgery	Distal femur tumour excision	1	4%	0	0%	1	5.032	0.54
	Femur implant removal	1	4%	0	0%	1		
	Distal femur nailing	1	4%	1	4%	2		
	Hemiarthroplasty	7	28%	7	28%	14		
	Proximal Femur nailing	15	60%	16	64%	31		
	Quadricepsplasty	0	0%	1	4%	1		
Total		25	100%	25	100%	50		

In group S, 60%, 28%, 4%, 4% and 4% of subjects underwent Proximal femur nailing, Hemiarthroplasty, Distal femur nailing, Femur implant removal, and Distal femur tumor excision respectively. In group I, Proximal femur nailing, Hemiarthroplasty, Distal femur nailing and Quadriseptoplasty was performed in 64%, 28%, 4% and 4% of subjects respectively. This overall distribution of subjects in regard to type of surgery was comparable in both groups.

FIGURE 6: DISTRIBUTION OF PATIENTS ACCORDING TO TYPE OF HIP SURGERY

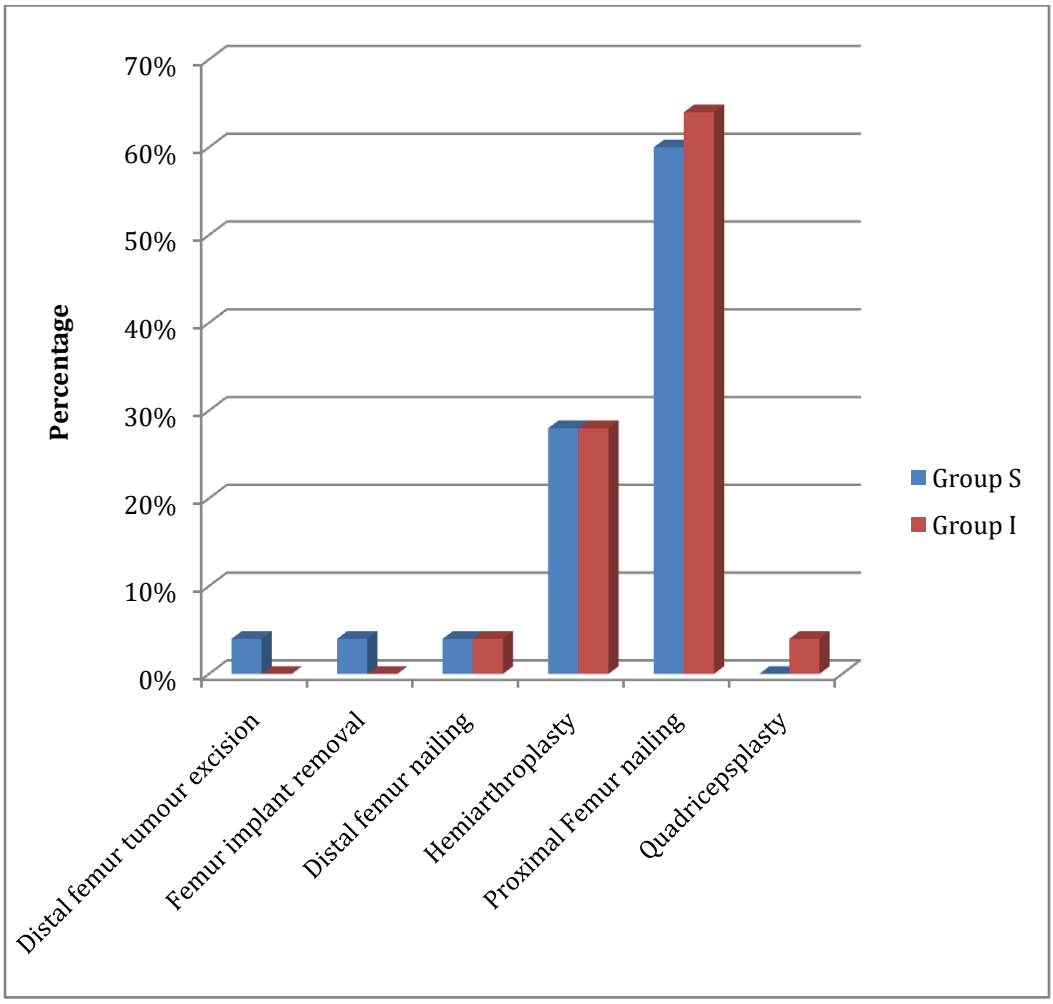


TABLE 4: DISTRIBUTION OF SUBJECTS ACCORDING TO LEVEL OF SENSORY BLOCKADE

		Group S		**Group I**		Total	Chi-square value	p-value
		Group S	Group S	Group I	Group I			
Level of sensory blockade	T10	12	48%	15	60%	27	1.515	0.469
	T8	12	48%	10	40%	22		
	T6	1	4%	0	0%	1		
Total		25	100%	25	100%	50		

In both the groups, level of sensory blockade was comparable. T 10,T 8 and T 6 level of sensory blockade were seen in 48%, 48 % and 4% subjects respectively in group S. T 10 and T 8 level sensory blockade was seen 60% and 40% subjects in group I. This suggests comparable levels of sensory blockade in both the groups.

FIGURE 7: DISTRIBUTION OF SUBJECTS ACCORDING TO LEVEL OF SENSORY BLOCKADE

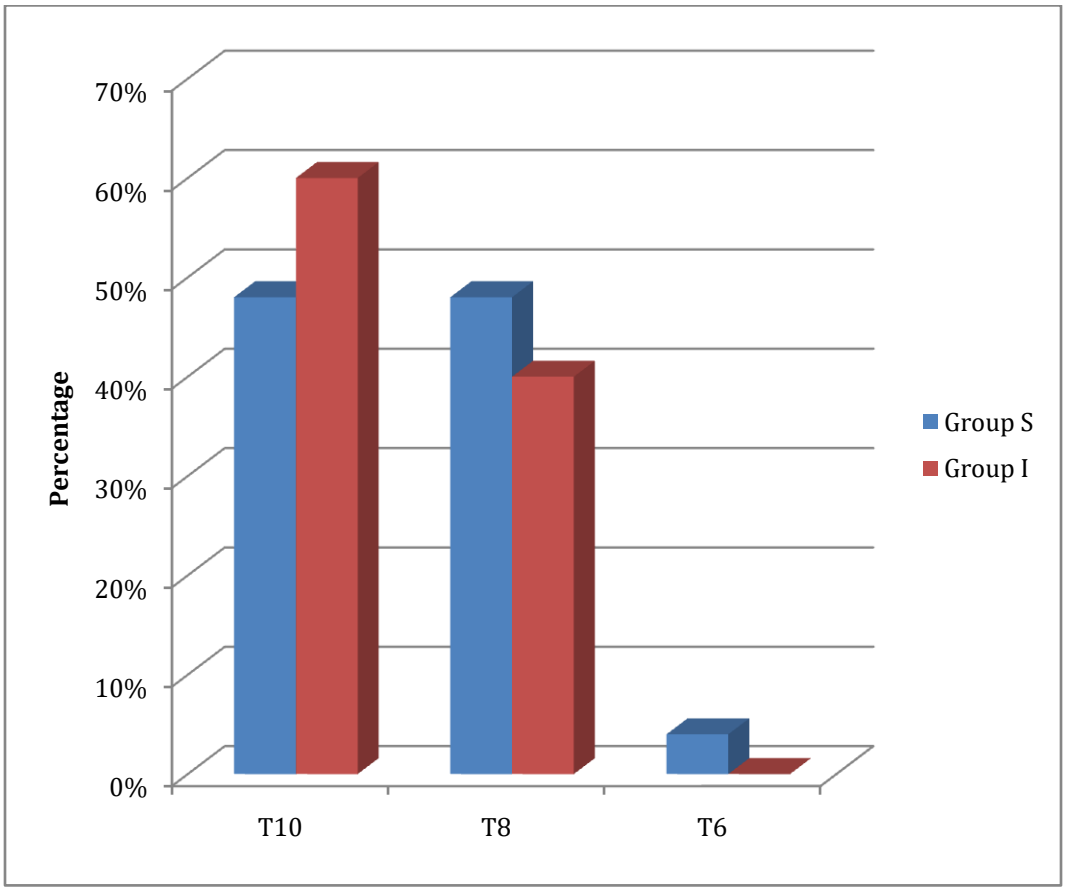


TABLE 5: DISTRIBUTION OF SUBJECTS ACCORDING TO LEVEL OF MOTOR BLOCKADE (Modified Bromage Scale)

		Group S		Group I		Total	Chi-square value	p-value
		Group S	Group S	Group I	Group I			
Level of motor blockade (Modified Bromage Scale)	1	0	0%	0	0%	0	1.020	0.312
	2	0	0%	0	0%	0		
	3	25	100%	25	100%	50		
Total		25	100%	25	100%	50		

Level of motor blockade was comparable in both groups signifying equally efficient spinal blockade.

FIGURE 8: DISTRIBUTION OF SUBJECTS ACCORDING TO LEVEL OF MOTOR BLOCKADE (Modified Bromage Scale)

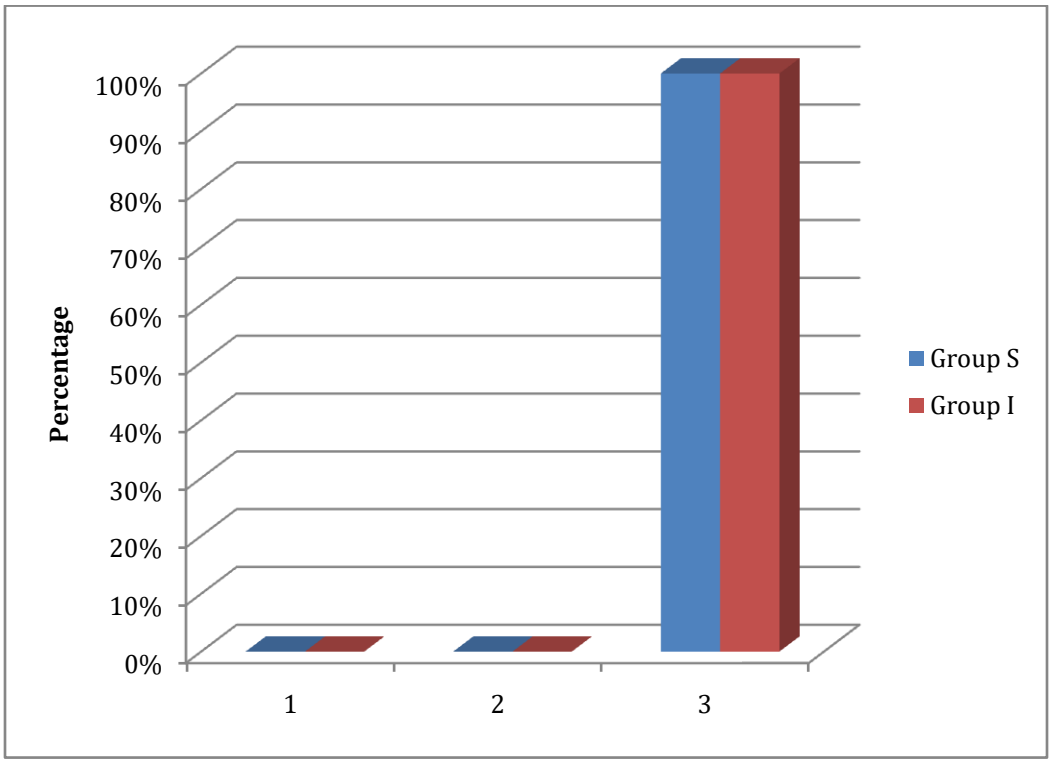


TABLE 6: MEAN DURATION OF SURGERY (in minutes)

	Group S		Group I		Z	p-value
	Mean	SD	Mean	SD		
Duration of surgery in minutes (time from skin incision to closure)	88.80	25.18	88.20	34.88	0.070	0.945

The mean duration of surgery was comparable in both groups

FIGURE 9: MEAN DURATION OF SURGERY (in minutes)

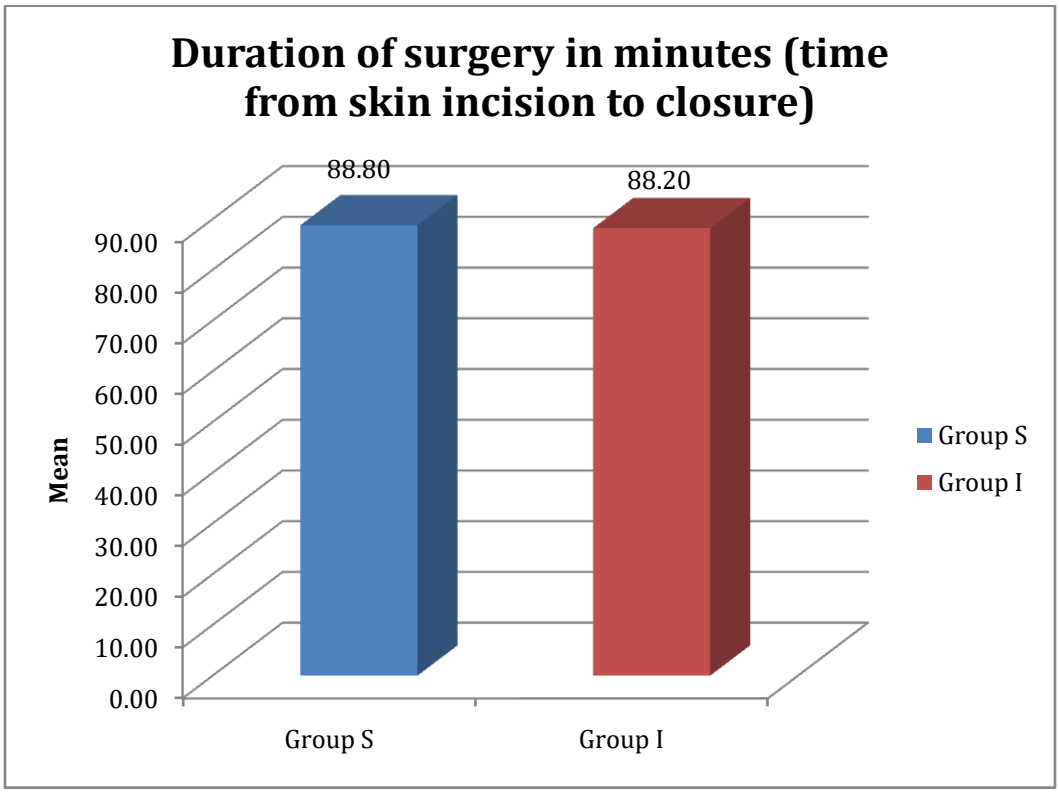


TABLE 7: MEAN ANALGESIC CONSUMPTION IN 24 HOURS POST OPERATIVELY (in mg)

	Group S		Group I		Z	p-value
	Mean	SD	Mean	SD		
Total amount of rescue analgesic used in 24 hours period (mg)	38.00	38.94	96.00	40.62	-4.171	0.001

Mean values of total rescue analgesic consumption in the 24 hours post-operative period was significantly less in group S than in group I patients (with p value (p=0.001)

FIGURE 10: MEAN ANALGESIC CONSUMPTION IN 24 HOURS POST-OPERATIVELY (in mg)

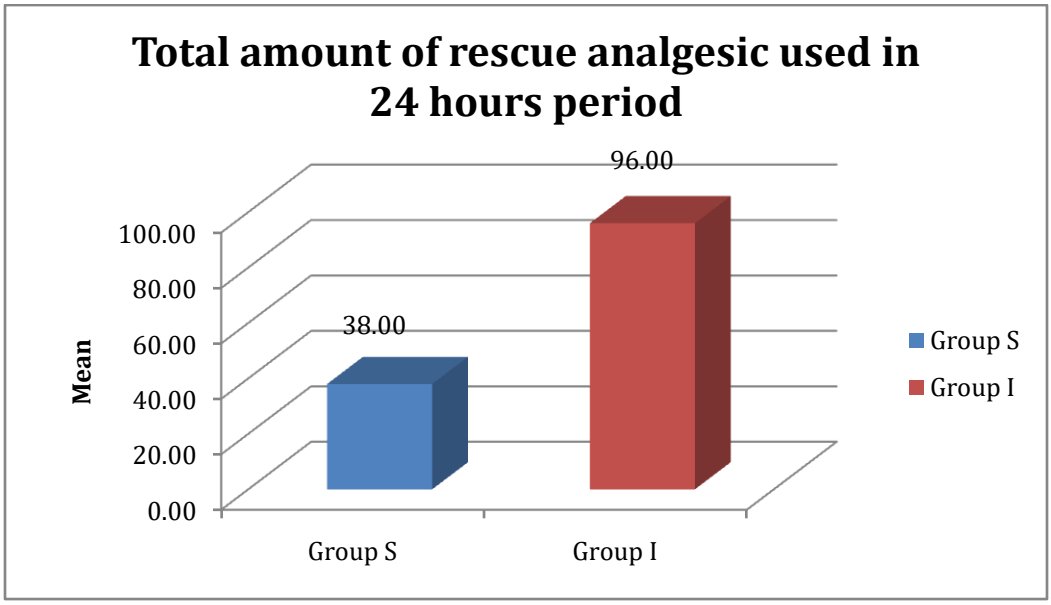


TABLE 8: TRENDS IN MEAN NRS SCORE IN 24 HOURS

	Group S		**Group I**		Z	p-value
	Mean	SD	Mean	SD		
NRS_0	0.08	0.40	0.00	0.00	-1.000	0.317
NRS_1	0.08	0.40	0.20	0.41	-1.635	0.102
NRS_2	0.28	0.61	0.44	0.65	-1.135	0.256
NRS_3	0.44	0.77	1.00	1.32	-1.878	0.060
NRS_4	0.80	0.82	1.40	0.96	-2.200	0.028
NRS_5	1.04	1.02	1.88	1.36	-2.325	0.020
NRS_6	1.36	1.75	2.56	1.61	-2.995	0.003
NRS_7	1.56	1.50	2.84	1.86	-2.658	0.008
NRS_8	1.32	1.14	2.56	1.56	-2.797	0.005
NRS_9	1.88	1.74	2.04	1.17	-1.041	0.298
NRS_10	1.72	1.37	2.16	1.25	-1.017	0.309
NRS_11	1.84	1.60	2.40	1.19	-1.952	0.051
NRS_12	1.64	1.60	2.36	1.52	-2.257	0.024
NRS_13	1.36	1.04	1.88	1.20	-1.558	0.119
NRS_14	1.24	0.93	1.72	1.17	-1.569	0.117
NRS_15	1.20	0.91	1.84	1.68	-1.259	0.208
NRS_16	1.32	1.60	2.00	1.80	-1.701	0.089
NRS_17	1.00	0.96	1.60	1.12	-1.922	0.055
NRS_18	0.80	0.87	1.84	1.25	-3.076	0.002
NRS_19	0.88	1.01	1.68	1.11	-2.708	0.007
NRS_20	0.88	0.83	2.20	2.00	-2.896	0.004
NRS_21	0.96	0.84	2.08	1.63	-2.721	0.007
NRS_22	1.00	1.08	1.92	1.26	-2.759	0.006
NRS_23	1.08	1.08	1.96	1.49	-2.262	0.024
NRS_24	0.84	0.75	2.04	1.88	-2.504	0.012

Statistically significant reduced NRS scores were observed at rest in group S at 4, 6, 8, 12 and 24 hours than group I.

FIGURE 11: TRENDS IN MEAN NRS SCORE IN 24 HOURS

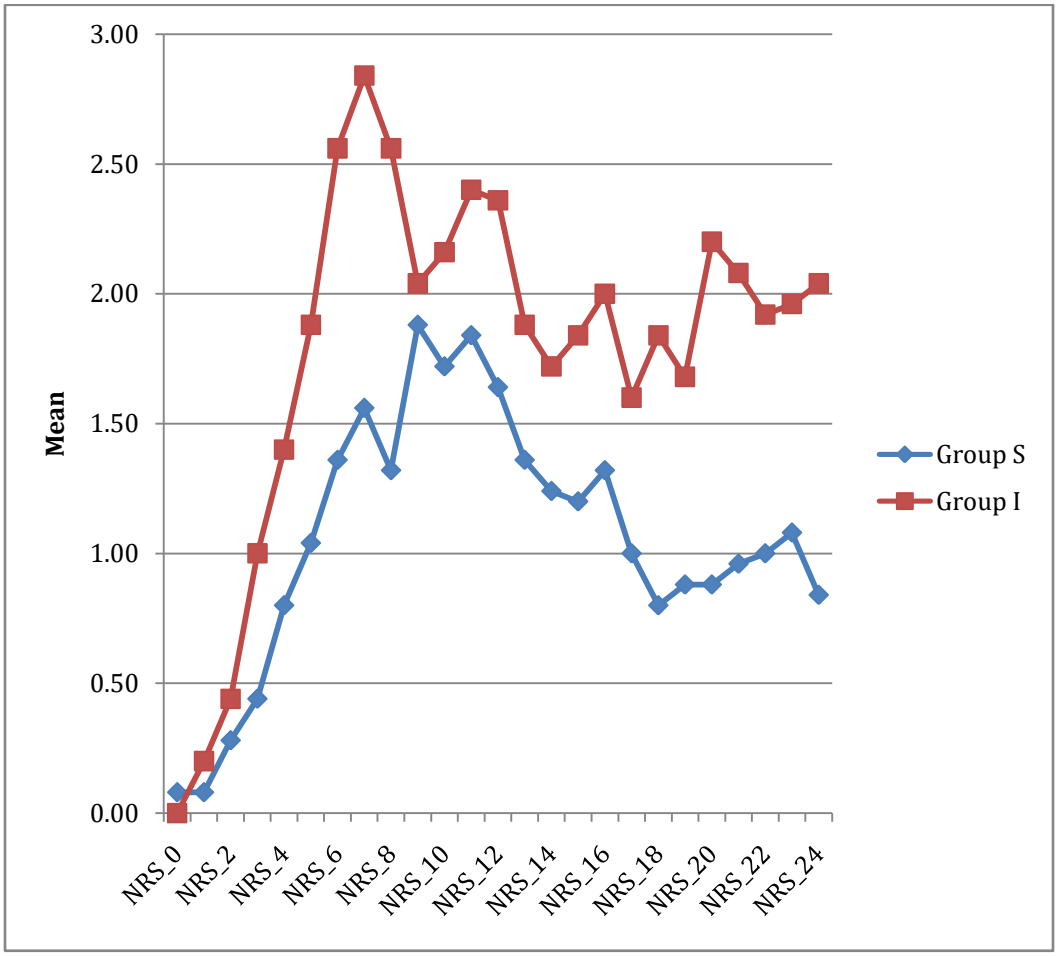


TABLE 9: MEAN DURATION OF ANALGESIA (in hours)

	Group S		Group I		Z	p-value
	Mean	SD	Mean	SD		
Total Duration of analgesia of FICB	16.12	7.72	9.04	4.34	-3.325	0.001

Mean duration of analgesia was defined as the time from administering the block to the time of first requirement of rescue analgesic at NRS ≥4.

The mean duration of analgesia was 16.12 ± 7.72 hours in group S and 9.04 ± 4.34 hours in group I. The difference was statistically significant among both groups.

Eleven patients of group S never complained of pain at any point of time during 24 hours with NRS ranging between 0-2 and only one patient in group I never complained of pain in 24 hours.

FIGURE 12: MEAN DURATION OF ANALGESIA (in hours)

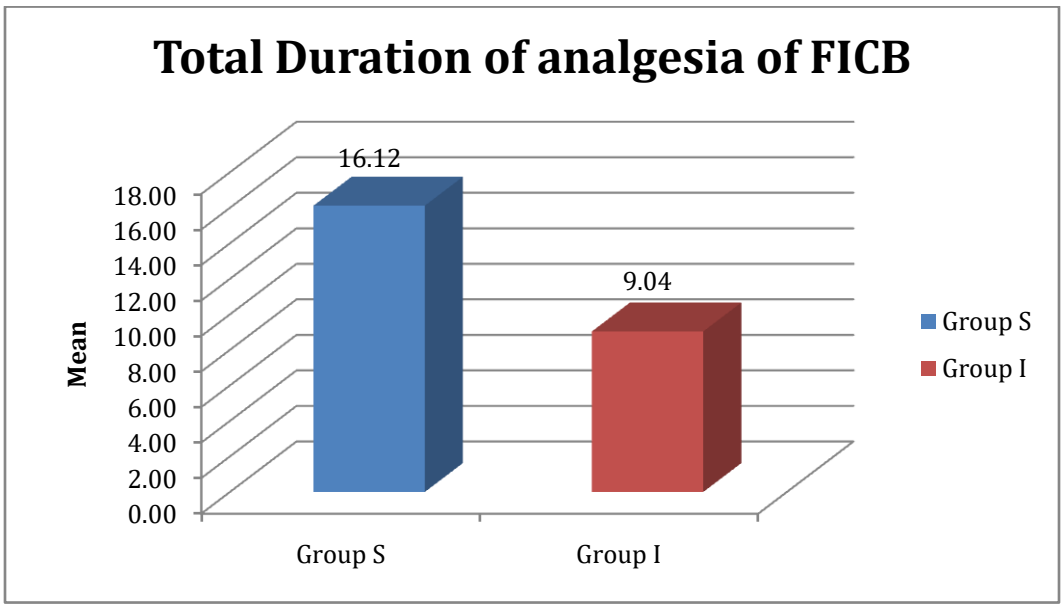
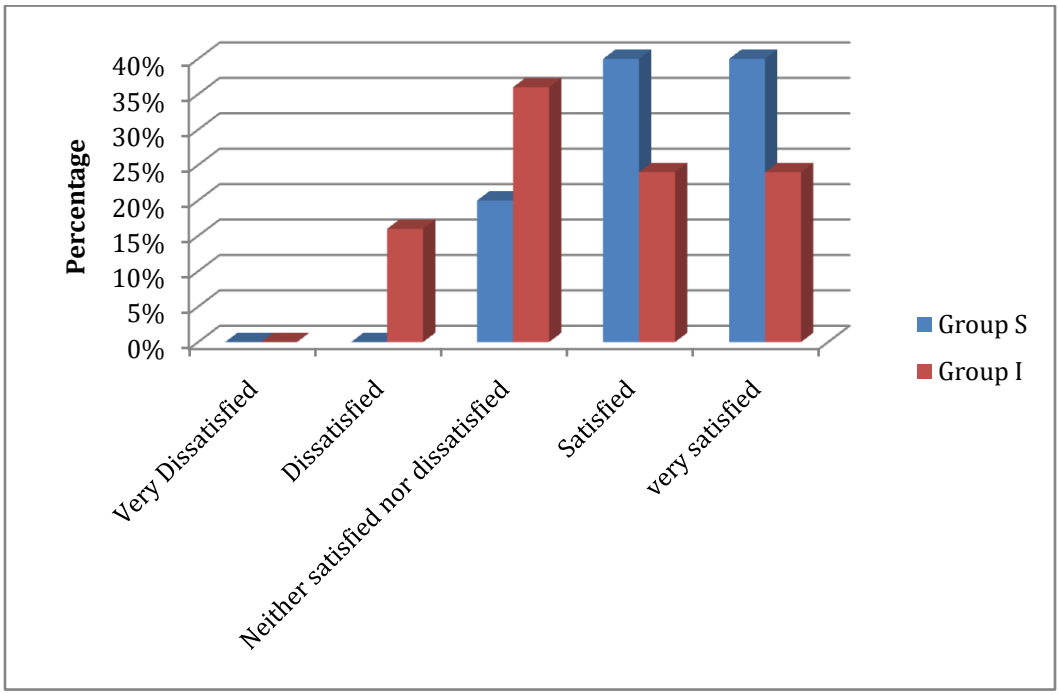


TABLE 10: QUALITY OF BLOCK AS ASSESSED BY PATIENT SATISFACTION SCORE AT THE END OF 24 HOURS POST OPERATIVELY (5-point Likert Scale)

		Group S		**Group I**		Total	Chi-square value	p-value
		Group S	Group S	Group I	Group I			
Overall patient satisfaction for pain management (within 24 hrs)	Very Dissatisfied	0	0%	0	0%	**0**		
	Dissatisfied	0	0%	4	16%	4	7.143	0.067
	Neither satisfied nor dissatisfied	5	20%	9	36%	14		
	Satisfied	10	40%	6	24%	16		
	very satisfied	10	40%	6	24%	16		
Total		25	100%	25	100%	50		

In group S, 40%, 40% and 20% subjects were very satisfied, satisfied and neither satisfied nor dissatisfied respectively while in group I, 36% subjects were neither satisfied nor dissatisfied and 24%, 24% subjects were very satisfied and satisfied respectively and 16% of subjects were dissatisfied.

FIGURE 13: QUALITY OF BLOCK AS ASSESSED BY PATIENT SATISFACTION SCORE AT THE END OF 24 POST-OPERATIVELY (5-point Likert Scale)



DISCUSSION

Patients with hip and femur fractures require continuous pain management from the time of prehospital admission till final rehabilitation. Optimal perioperative analgesia is an issue of great concern. To improve the final outcome of the patient, an ideal postoperative analgesic regimen is mainly important to attenuate stress response in the postoperative period. Inadequate pain control may lead to serious medical issues such as tachycardia, myocardial ischemia, and venous thromboembolism. Adequate postoperative analgesia facilitates earlier patient mobilisation and better satisfaction scores in terms of pain.

The surgeries for femur fracture include Hemi arthroplasty, Distal Hip Screw, Proximal Femur Nailing etc. The site of skin incision in majority of these surgeries is on the junction of medial and lateral thigh and about 2 cm from the ASIS. The femoral and lateral cutaneous nerve of thigh covers the cutaneous distribution of this area. The Fascia lata and the Vastus muscles which are retracted during the procedure are supplied by the femoral nerve. The FICB effectively blocks Femoral and Lateral Cutaneous Nerve of Thigh, thus providing effective pre and post operative analgesia in patients with fracture neck of femur, femoral shaft fracture, trochanteric fracture and total hip replacement. [42]

Pain following lower limb surgeries is more pronounced in the first 24 hours postoperatively and is further aggravated on mobilization. Conventionally, patients receive intravenous opioids for postoperative analgesia but systemic opioids provide only static pain relief and do not control the dynamic component of pain. Dynamic analgesia is provided mainly by regional anaesthesia techniques in the postoperative period. [43] Epidural analgesia is the gold standard technique that has been used for postoperative pain relief. Epidural block with local anesthetics with or without an opioid are superior to other forms of analgesia, but have their

own side effects like severe hypotension, nausea vomiting, urinary retention, delayed ambulation. There is also a risk of developing an epidural hematoma with concomitant use of postoperative anticoagulation [44,45]

Peripheral nerve blocks can be used as an alternative to epidural analgesia, [46] but failure rate is high in peripheral nerve blocks administered by landmark based techniques. With the advent of ultrasonogram, peripheral nerve blocks gained popularity especially for lower limb surgeries like lumbar plexus block (posterior approach psoas compartment block & anterior approach femoral 3-in-1 block), fascia iliaca block, sciatic nerve block. One of the easiest US guided peripheral nerve block used for postoperative pain relief especially for femur surgery is the Fascia Iliaca Compartment Block (FICB). [47]

The effectiveness of FICB in comparison to various other peripheral nerve blocks has been established in various studies but there is a dearth of literature comparing the US guided infrainguinal and suprainguinal approaches of FICB for achieving successful postoperative analgesia in hip and femur surgeries.

Our study aimed to compare the analgesic efficacy of ultra sound guided suprainguinal approach vs infrainguinal approach of fascia iliaca compartment block for postoperative pain relief. We compared consumption of the total amount of rescue analgesic in 24 hour period among both groups , NRS scores every hourly till 24 hours,duration of analgesia, postoperative nausea and vomiting and patient satisfaction score for pain management in patients undergoing above knee lower limb surgies under subarachnoid block.

We chose 0.2% ropivacaine due to its significantly low neurotoxic and cardiotoxic potential. In addition, it results in a lower incidence of motor blockade secondary to greater degree of motor sensory differentiation, thereby further supporting early mobilization and safety in post-operative period. [19]

In our study, both the groups of patients were statistically comparable in respect to demographic profile, type and duration of surgery and anaesthesia. The mean 24 hour tramadol consumption was significantly less in group S than group I (38mg vs 96mg) (p value = 0.001). Pain intensity as suggested by mean NRS was found to be significantly lower in group S as compared to group I at 4 hours (0.80 vs 1.40) 6 hours (1.36 vs 2.56) 8 hours (1.32 vs 2.56) 12 hours (1.64 vs 2.36) and 24 hours (0.84 vs 2.04) post-operatively. The time of first requirement of rescue analgesic at NRS ≥4 was significantly prolonged in group S (16.12 hours) than in group I (9.04 hours) in our study. (p = 0.001)

These findings imply superior analgesic efficacy of suprainguinal approach of FICB over infrainguinal approach. We observed 60% more opioid sparing effect with suprainguinal approach than with infrainguinal approach of FICB. Our findings are consistent with the findings of Kumar et al who also compared postoperative analgesic efficacy of suprainguinal and infraiguinal approach of FICB and found out 34% more morphine sparing effect of suprainguinal FICB in Total Hip Arthroplasty. [30] While Stevens et al showed 40% lower morphine consumption in supraiguinal FICB vs sham block. [3] Higher opioid sparing in our study could be due to the use of Ultra sound guidance for block administration resulting in higher success rate.

In our study , NRS scores were used to measure pain intensity which were significantly lower in suprainguinal FICB at 4,6,8,12 and 24 hours postoperatively as compared to Infrainguinal FICB . However, Kumar et al in their study assessed post operative pain using VAS scores and found significantly reduced pain scores at 6 hours post operatively in supraiguinal vs infraiguinal approach of FICB (VAS scores assessed at 3,6,12 & 24 hours)

We used 30 ml of 0.2% Ropivacaine for administering US guided block in comparison to Kumar et al who used 40 ml of 0.2% Bupivacaine to administer the block using landmark technique. [30] However, significant reduction in pain scores between the two groups were observed earlier in our study (4 hours) using smaller volume of LA compared to Kumar (6 hours) , owing to more precision of block using US guidance.

In our study, the mean duration of analgesia, defined as the time of administering the block to the time of first requirement of rescue analgesia at NRS ≥ 4, was significantly better in suprainguinal group (16.2 ± 7.72 hours) than in infrainguinal (9.04 ± 4.34 hours). We found very few study comparing these two approaches of FICB in regards to mean duration of analgesia.

All our findings are in concordance with Stevens hypothesis [3] which stated that cephalic spread of local anaesthetic is more in suprainguinal FICB attributing to better blockage of lumbar plexus compared to infraiguinal FICB resulting in better analgesia. Hebbard et al in his cadaveric study [16] also demonstrated the higher cephalad spread of local anesthetic by depositing the same volume above the inguinal ligament. In contrast, Marhofer et al [48] used Magnetic Resonance Imaging to assess the spread of local anesthetics after a series of Femoral Nerve Block and

concluded that there was no cephalad spread of local anaesthetic which could have resulted in lumbar plexus block.

A few previous studies have questioned the efficacy of the conventional Infrainguinal FICB. Shariet et al in his study proved that infrainguinal FICB conferred no significant benefit over sham block in Total Hip Arthroplasty. [49] A study by Goitia et al found Infrainguinal FICB to be effective for upto 6 hours post block in THA but no difference in VAS scores were noticed for the rest of 24 hours. [50] These findings are in concordance with our study as the mean duration of analgesia was lesser in infrainguinal FICB (~9 hours) than suprainguinal FICB (~16 hours) and the difference was statistically significant (p value = 0.001)

We used a 5-point Likert Scale to assess patient satisfaction scores for pain relief. The results were comparable in both the groups and we found no studies in literature comparing patient satisfaction scores between the two approaches of FICB.

Post operative nausea and vomitting were mostly absent in both the groups due to opioid sparing effect of FICB and better pain relief with multimodal analgesia .

We chose to give single shot FICB over continuous FICB as it is simpler, easy to administer and helps tide over the post operative pain which is severe during first 24 hours. However, continuous FICB requires insertion of perineural catheters which are expensive and require maintenance but provide prolonged post operative pain relief using continuous infusions. Further studies with continuous blockade can help to ensure efficacy of these blocks for extended period in various surgeries.

We did not access quadriceps muscle weakness in our study because we used 0.2% Ropivacaine as local anaesthetic which provides only sensory blockade. A study of Aliste et al used 0.25% Levobupivacaine as local anaesthetic and reported higher incidence of quadriceps motor block with suprainguinal FICB than PENG block following Total Hip Arthroplasty [36] but could not quantitatively measure it. A rather recent study by YS Choi compared PENG and FICB by administering 20 ml of 0.2% Ropivacaine and 30 ml of 0.2% Ropivavaine respectively. He assessed quadriceps muscle strength using a dynamometer and proved that quadriceps muscle weakness was comparable in both the groups. Also, there was no significant difference in quadriceps muscle strength in operative and non-operative leg suggesting that 0.2% Ropivacaine has little to no motor effect. [37] We further suggest researchers to study the effect of FICB with 0.2% Ropivacaine on quadriceps muscle strength.

There were a few limitations in our study that are worth mentioning. First, different types of surgeries were performed by different surgeons, thus causing the differences in surgical approach, tissue handling and operative time which could have influenced intensity of pain amongst our subjects. Secondly, the anaesthesiologist administering the blocks couldn't be blinded but we tried to overcome this drawback as the person (recording the NRS scores) monitoring post operatively was unaware of the block administered. Third limitation was that all patients received Spinal anaesthesia which could be a confounding factor resulting in variable effect on post operative analgesic requirement. For this purpose, patients enrolled in this study were of similar demographic characteristics and a standard dose of 12.5 mg Bupivacaine was used wih 25 microgram Fentanyl which resulted in comparable sensory and motor blockade in both the groups.

But despite these limitations, our study design offered major advantage over other studies. We administered the block with smaller volumes of LA using Ultra Sound guidance resulting in better success rates in terms of analgesic efficacy. Most of the other studies comparing the two approaches of FICB used landmark technique to administer block.

We thus conclude that suprainguinal FICB has superior analgesic efficacy compared to infrainguinal FICB in terms of less opioid consumption in first 24 hours,reduction in post operative NRS scores and prolonged duration of analgesia. However, further studies wih larger sample sizes are needed to validate this point.

SUMMARY & CONCLUSION

The present study was conducted in the Department of Anaesthesiology, Dayanand Medical College and Hospital, Ludhiana after getting approval from the Institutional Ethical Committee. The aim was to compare the analgesic efficacy of ultra sound guided suprainguinal approach of fascia iliaca compartment block with that of infrainguinal approach of fascia iliaca compartment block for postoperative pain relief.

Fifty patients belonging to ASA grade I, II or III scheduled for above knee lower limb orthopedic surgeries under SA were included in a randomized, double blind manner after obtaining a written informed consent. Patients were randomly allocated using computer generated random numbers to either of the two groups to receive:

GROUP S

Comprising of 25 patients who received local anaesthetic solution of 30 mL of 0.2% ropivacaine using ultrasound guided suprainguinal approach

GROUP I

Comprising of 25 patients who received local anaesthetic solution of 30 mL of 0.2% ropivacaine using ultrasound guided infrainguinal approach

The block was performed by experienced anaesthesiologists after administration of spinal anaesthesia.

After administration of the FICB, patients were assessed for postoperative pain relief for above knee lower limb orthopedic surgeries. This was evaluated by comparative consumption of total amount of analgesic in 24 hour period among both groups,NRS scores,duration of analgesia and

patient satisfaction score using 5 point Likert scale . Results were analysed statistically.

We observed that

1) Mean 24 hour tramadol consumption was significantly less in group S than group I (38mg vs 96mg) (p value = 0.001).

2) Pain intensity as suggested by mean NRS was found to be significantly lower in group S as compared to group I at 4 hours (0.80 vs 1.40) 6 hours (1.36 vs 2.56) 8 hours (1.32 vs 2.56) 12 hours (1.64 vs 2.36) and 24 hours (0.84 vs 2.04) post-operatively.

3) The time of first requirement of rescue analgesic at NRS ≥4 was significantly prolonged in group S (16.12 hours) than in group I (9.04 hours) in our study. (p = 0.001)

Hence, from the results of our study we conclude that suprainguinal FICB is more effective than the infrainguinal FICB for postoperative analgesia in above knee lower limb orthopaedic surgeries with significant opioid sparing effect postoperatively.

BIBLIOGRAPHY

1. Suarez JC, Al-Mansoori AA, Kanwar S. Effectiveness of novel adjuncts in pain management following total knee arthroplasty: a randomized clinical trial. J Arthroplasty. 2018;33:S136-S141.
2. Becchi C, Al Malyan M, Coppini R, Campolo M, Magherini M, Boncinelli S. Opioid-free analgesia by continuous psoas compartment block after total hip arthroplasty. A randomized study. EJA. 2008;25:418-23.
3. Stevens M, Harrison G, McGrail M. A modified fascia iliaca compartment block has significant morphine-sparing effect after total hip arthroplasty. Anaesth Int care. 2007;35:949-52.
4. Neuman MD, Silber JH, Elkassabany NM, Ludwig JM, Fleisher LA. Comparative effectiveness of regional versus general anesthesia for hip fracture surgery in adults. Anesthesiology. 2012;117:72-92.
5. Opperer M, Danninger T, Stundner O, Memtsoudis SG. Perioperative outcomes and type of anesthesia in hip surgical patients: An evidence based review. World J Orthop. 2014;5:336-43.
6. Desai V, Chan PH, Prentice HA. Is Anesthesia Technique Associated With a Higher Risk of Mortality or Complications Within 90 Days of Surgery for Geriatric Patients With Hip Fractures? Clin Orthop Rel Res. 2018;476:1178-88.
7. Qiu C, Chan PH, Zohman GL, Prentice HA, Hunt JJ, LaPlace DC, et al. Impact of Anesthesia on Hospital Mortality and Morbidities in Geriatric Patients Following Emergency Hip Fracture Surgery. J Orthop Trauma. 2018;32:116-23.
8. Guay J, Johnson RL, Kopp S. Nerve blocks or no nerve blocks for pain control after elective hip replacement (arthroplasty) surgery in adults. Cochrane Database Syst Rev. 2017;10:CD011608.

9. Torre M, Laricchiuta P, Luzi I, Ceccarelli S, Carrani E, Masciocchi M, et al. Italian Arthroplasty Registry Project. Better data quality for better patient safety. Fourth Report. 2017.
10. Tsai TP, Vuckovic I, Dilberovic F, Obhodzas M, Kapur E, Divanovic KA, et al. Intensity of the stimulating current may not be a reliable indicator of intraneural needle placement. Regional Anesthesia & Pain Medicine. 2008;33:207-10.
11. Gadsden J, McCally C, Hadzic A. Monitoring during peripheral nerve blockade. Curr Opin Anaesthesiol. 2010;23:656-61
12. Winnie AP, Ramamurthy S, Durrani Z. The inguinal paravascular technic of lumbar plexus anesthesia: the “3-in-1 block”. Anesthesia & Analgesia. 1973;52:989-96.
13. Dalens B, Vanneuville G, Tanguy A. Comparison of the fascia iliaca compartment block with the 3-in-1 block in children. Anesthesia & Analgesia. 1989;69:705-13.
14. Martins RS, Siqueira MG, Silva Jr FC, Heise CO, Teixeira MJ. A practical approach to the lateral cutaneous nerve of the thigh: An anatomical study. Clinical neurology and neurosurgery. 2011;113:868-71.
15. Aszmann OC, Dellon ES, Dellon AL. Anatomical course of the lateral femoral cutaneous nerve and its susceptibility to compression and injury. Plast Reconstr Surg 1997;100:600–604
16. Hebbard P, Ivanusic J, Sha S. Ultrasound-guided suprainguinal fascia iliaca block : a cadaveric evaluation of a novel approach. Anaesthesia. 2011;66:300-5.
17. Dolan J, Williams A, Murney E, Smith M, Kenny GN. Ultrasound guided fascia iliaca block: a comparison with the loss of resistance technique. Reg Anesth Pain Med. 2008;33:526-31
18. K. Vermeylen, I. Van HerrewegHe, I. leunen, F. SoetenS, m. Van de Velde. History of the fascia iliaca compartment block. Acta Anaesth. Belg., 2019, 70, 131-140

19. Kuthiala G, Chaudhary G. Ropivacaine: A review of its pharmacology and clinical use. Indian J Anaesth. 2011;55:104-10.
20. Shin JJ, McCrum CL, Mauro CS, Vyas D. Pain Management after Hip Arthroscopy: Systematic Review of Randomized Controlle Trials and Cohort Studies. Am J Sports Med. 2018;46:3288-98.
21. Girish Joshi, Kishor Gandhi, Nishant Shah, Jeff Gadsden, Shelby L Corman . Peripheral nerve blocks in the management of postoperative pain: challenges and opportunities. J Clin Anesth 2016;35:524-529.
22. Short AJ, Barnett JJG, Gofeld M, Baig E, Lam K, Agur AM, et al. Anatomic study of innervation of the anterior hip capsule: implication for image-guided intervention. Reg Anesth Pain Med. 2018;43:186-92
23. Chan EY, Fransen M, Parker DA, Assam PN, Chua N. Femoral nerve blocks for acute postoperative pain after knee replacement surgery. Cochrane Database Syst Rev. 2014;2014:1-167
24. Gardner E. The innervation of the hip joint.Anat Rec. 1948;101:353-71.
25. Birnbaum K, Prescher A, Hessler S, Heller KD. The sensory innervation of the hip joint--an anatomical study. Surg Radiol Anat. 1997;19:371-5.
26. X Capdevila 1, P Biboulet, M Bouregba, Y Barthelet, J Rubenovitch, F d'Athis et al. Comparison of the three-in-one and fascia iliaca compartment blocks in adults: clinical and radiographic analysis. Anesth Analg. 1998;86:1039-44.
27. O'Reilly N, Desmet M, Kearns R. Fascia iliaca compartment block. BJA Education. 2019;6:191-7.
28. Bouaziz H., Vial F., Jochum D. An evaluation of the cutaneous distribution after obturator nerve block. Anesth Analg. 2002;94:445-449.
29. Desmet M, Vermeylen K, Van Herreweghe I, Carlier L, Soetens F, Lambrecht S, et al. A longitudinal supra-inguinal fascia iliaca

compartment block reduces morphine consumption after total hip arthroplasty. Regional Anesthesia & Pain Medicine. 2017 ;42:327-33.

30. Kumar K, Pandey RK, Bhalla AP, Kashyap L, Garg R, Darlong V, et al. Comparison of conventional infrainguinal versus modified proximal suprainguinal approach of Fascia Iliaca Compartment Block for postoperative analgesia in Total Hip Arthroplasty. A prospective randomized study. Acta Anaesthesiol Belg. 2015;66:95-100.
31. Hards M, Brewer A, Bessant G, Lahiri S. Efficacy of prehospital analgesia with fascia iliaca compartment block for femoral bone fractures: a systematic review. Prehospital and Disaster Medicine. 2018;33:299-307.
32. Vermeylen K, Desmet M, Leunen I, Soetens F, Neyrinck A, Carens D, et al. Supra-inguinal injection for fascia iliaca compartment block results in more consistent spread towards the lumbar plexus than an infra-inguinal injection: a volunteer study. Regional Anesthesia & Pain Medicine. 2019;44:483-91.
33. Wan HY, Li SY, Ji W, Yu B, Jiang N. Fascia Iliaca Compartment Block for Perioperative Pain Management of Geriatric Patients with Hip Fractures: A Systematic Review of Randomized Controlled Trials. Pain Res Manag. 2020;2020:8503963.
34. Azizoğlu M, Rumeli Ş. Comparison of the suprainguinal fascia iliaca compartment block with continuous epidural analgesia in patients undergoing hip surgeries: a retrospective study. Brazilian Journal of Anesthesiology. 2022;72:342-9.
35. Lin C, Shi J, Yuan L, Li J. Application of ultrasound guided FICB block in femoral shaft fracture fixation offers improved pain control while effectively sustaining the stability of vital signs. Int J Exp Med. 2020;13:1156-62.
36. Aliste J, Layera S, Bravo D, Jara Á, Muñoz G, Barrientos C, et al. Randomized comparison between pericapsular nerve group (PENG)

block and suprainguinal fascia iliaca block for total hip arthroplasty. Reg Anesth Pain Med. 2021;46:874-8.

37. Choi YS, Park KK, Lee B, Nam WS, Kim DH. Pericapsular Nerve Group (PENG) block versus supra-inguinal fascia iliaca compartment block for total hip arthroplasty: a randomized clinical trial. Journal of Personalized Medicine. 2022;12:408.
38. Dubey S, Ambi U, Taank P, Singh S, Patnaik S, Hooda B, Sasidharan S. Comparison of two ultrasound-guided approaches for the fascia iliaca compartment block in patients with a proximal femur fracture. Hamdan Med J 2021;14:191-5
39. Gupta N, Jain P, Kapadia M, Sanwatsarkar S, Saxena D, Maheshwari M. The effect of 0.25% levobupivacaine and 0.25% ropivacaine in fascia iliaca block in elderly patients with fracture femur given before positioning for subarachnoid block. Int J Res Med Sci. 2018;6:191-4.
40. Vermeylen K, Soetens F, Leunen I, Hadzic A, Van Boxtael S, Pomés J, et al. The effect of the volume of supra-inguinal injected solution on the spread of the injectate under the fascia iliaca: a preliminary study. Journal of anesthesia. 2018;32:908-1.
41. Elsharkawy RA, Messeha MM, Elgeidi AA. The influence of different degrees of temperature of intrathecal levobupivacaine on spinal block characteristics in orthopedic surgeries: A prospective randomized study. Anesth Essays Res 2019;13:509-14
42. Grant CRK, Chetketts MR. Analgesia for primary hip and knee arthroplasty: the role of regional anesthesia. Br J Anesth: CEACCP. 2008;8: 56–61.
43. Foss NB, Kristensen MT, Kristensen BB, Jensen PS, Kehlet H. Effect of postoperative epidural analgesia on rehabilitation and pain after hip fracture surgery: a randomized, double-blind, placebo-controlled trial. The Journal of the American Society of Anesthesiologists. 2005;102:1197-204.

44. Jason A. Campagna M.D., Ph.D., Christopher Carter, M.D. et.al., Clinical Relevance of the Bezold–Jarisch Reflex. Anesthesiology 2003;98:1250-60.
45. Gramigni E.,"Epidural analgesia and postoperative hemodynamic changes "European journal of anesthesia 2013;30:398-404.
46. Duarte LT, Beraldo PS, Saraiva RÂ. Effects of epidural analgesia and continuous lumbar plexus block on functional rehabilitation after total hip arthroplasty. Revista Brasileira de Anestesiologia. 2009;59:531-44.
47. Monzon DG, Iserson KV, Vazquez JA. Single fascia iliaca compartment block for post-hip fracture pain relief. J Emerg Med. 2007;32:257-62.
48. Marhofer P, Nasel C, Sitzwohl C, Kapral S. Magnetic resonance imaging of the distribution of local anesthetic during the three-in-one block. Anesth Analg. 2000;90:119-24.
49. Shariat AN, Hadzic A, Xu D, Shastri U, Kwofie K, Gandhi K, et al. Fascia lliaca block for analgesia after hip arthroplasty: a randomized double-blind, placebo-controlled trial. Regional Anesthesia & Pain Medicine. 2013;38:201-5.
50. Arrola LG, Telletxea S, Bourio RM, Maguregui AA, Larracoechea UA. Bloqueo iliofascial para analgesia postoperatoria de prótesis stotal de cadera. Revista Española de Anestesiología y Reanimación. 2009;56:343-8.

PROFORMA

Randomization code:

Enrollment date:

SR No:

Name:

MRD No:

Age:

Gender:

Type of Lower Limb surgery:

ASA grade:

Time of Subarachnoid Block:

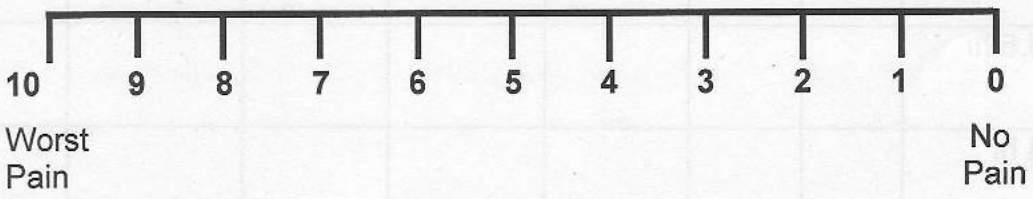
Level of sensory blockade:

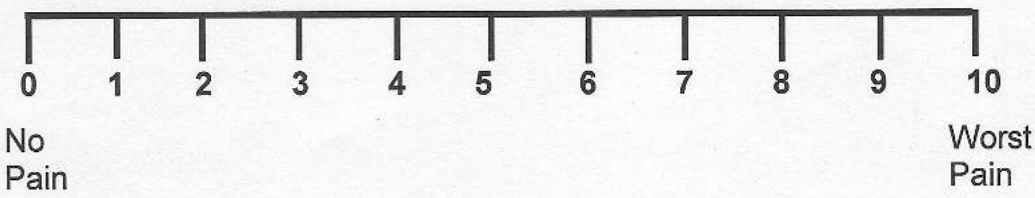
Level of motor blockade (Modified Bromage Scale):

Time of institution of FICB block :

Duration of surgery in minutes (time from skin incision to closure):

NUMERICAL RATING SCALE (PAIN SCALE)





Signature of Candidate **Signature of Supervisor**

INTRA OPERATIVE VITALS

Time	Time	Heart Rate (bpm)	SBP (mmHg)	Mean Arterial Pressure (mmHg)	DBP (mmHg)	Oxygen Saturation (%)	Respiratory Rate (per minute)
Baseline							
0 min (initiation of block)							
30 mins							
1 hr							
1.5 hr							
2 hr							
2.5 hr							
3 hr							
3.5 hr							
4 hr							

Signature of Candidate **Signature of Supervisor**

POST OPERATIVE VITALS

Time since FICB (hours)	Heart rate (bpm)	SBP (mm Hg)	DBP (mm Hg)	Oxygen Saturation (%)	NRS	Time of first rescue analgesic given (minutes)	Amount of analgesic given (mg)
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							

Signature of Candidate **Signature of Supervisor**

Total amount of rescue analgesic used in 24 hours period: mg

Time at which NRS Score is ≥ 4 for the first time post-operatively:

Total Duration of analgesia of FICB:

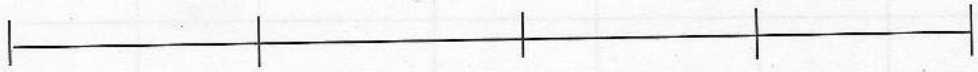
Postop nausea and vomiting (within 24 hrs):

- ☐ None-0
- ☐ Mild-1
- ☐ Moderate-2
- ☐ Vomiting-3

Any other postop complication (?)

Overall patient satisfaction for pain management (within 24 hrs):

- ☐ very satisfied
- ☐ satisfied
- ☐ neither satisfied nor dissatisfied
- ☐ dissatisfied
- ☐ very dissatisfied



Very satisfied | satisfied | neither satisfied nor dissatisfied | dissatisfied | very dissatisfied

Signature of Candidate

Signature of Supervisor

Sr. No	Randomization code	Enrollment date	Name	MRD No	Age	Gender	Weight	Height	BMI	Type of Lower Limb surgery	ASA grade	Time of Subarachnoid Block	Level of sensory blockade	Level of motor blockade (Modified Bromage Scale)	Time of institution of FICB block	Duration of surgery in minutes (time from skin incision to closure)
1	I	05-02-2021	S	250519	82	Male	76	177	24.3	Proximal Femur Nailing	3	12:25	T10	3	12:30 PM	150
2	S	06-02-2021	M	591665	90	Male	68	172	23.0	Hemiarthroplasty	3	12:05 PM	T10	3	12:10 PM	120
3	S	09-02-2021	K	3626	73	Female	60	157	24.3	Proximal Femur Nailing	3	11:20 AM	T8	3	11:30 PM	120
4	I	18/02/2021	G	896223	65	Female	60	160	23.4	Hemiarthroplasty	2	10:20 AM	T10	3	10:30 AM	140
5	I	23/02/2021	R	1032978	82	Female	68	160	26.6	Hemiarthroplasty	3	12:40 PM	T8	3	12:45 PM	90
6	S	04-03-2021	V	1037085	47	Male	78	172	26.4	Proximal Femur Nailing	3	11:50 AM	T6	3	12:00 PM	75
7	I	16/04/2021	Bd	887264	78	Female	65	160	25.4	Proximal Femur Nailing	3	9:50 AM	T10	3	10:00 AM	75
8	I	16/04/2021	DD	1085190	85	Male	80	172	27.0	Proximal Femur Nailing	3	11:55 AM	T10	3	12:00 PM	60
9	S	21/04/2021	M	1091471	35	Male	90	170	31.1	Proximal Femur Nailing	2	4:50 PM	T10	3	5:00 PM	90
10	S	24/04/2021	PC	1094087	67	Male	77	172	26.0	Hemiarthroplasty	2	9:15 AM	T8	3	9:30 AM	120
11	S	26/05/2021	S	1125731	27	Male	78	175	25.5	Femur nailing	1	2:45 PM	T8	3	2:55 PM	60
12	I	22/06/2021	K	1125815	65	Female	70	162	26.7	Proximal Femur Nailing	3	2:40 PM	T8	3	2:45 PM	105
13	S	24/06/2021	BS	403718	53	Male	82	157	33.3	Femur implant removal	2	9:20 AM	T10	3	9:25 AM	120
14	S	03-07-2021	US	1010875	83	Male	76	172	25.7	Hemiarthroplasty	3	11:25 AM	T10	3	11:30 AM	50
15	S	03-07-2021	BR	1131006	71	Male	74	175	24.2	Hemiarthroplasty	3	12:30 PM	T10	3	12:35 PM	100
16	I	06-07-2021	BD	1132365	77	Female	65	154	27.4	Proximal Femur Nailing	3	2:20 PM	T8	3	2:30 PM	60
17	I	15/07/2021	K	836758	23	Male	82	170	28.4	Quadricepsplasty	1	9:00 AM	T10	1	9:10 AM	180
18	S	15/07/2021	SD	1016986	70	Female	65	152	28.1	Proximal Femur Nailing	3	9:55 AM	T10	3	10:00 AM	120
19	I	16/07/2021	JK	1137220	80	Female	68	157	27.6	Proximal Femur Nailing	3	11:50 AM	T10	3	12:00 PM	60
20	I	20/07/2021	SK	867815	71	Female	70	154	29.5	Hemiarthroplasty	2	8:50 AM	T8	3	9:00 AM	120
21	S	23/07/2021	SR	1140962	76	Female	72	157	29.2	Proximal Femur Nailing	3	10:50 AM	T8	3	11:00 AM	120

Sr. No	Randomization code	Enrollment date	Name	INTRA OPERATIVE VITALS																					
				Heart Rate (bpm)											SBP (mmHg)										Mean Arteri
				Baseline	0 min (initiation of block)	30 mins	1 hr	1.5 hr	2 hr	2.5 hr	3 hr	3.5 hr	4 hr	Baseline	0 min (initiation of block)	30 mins	1 hr	1.5 hr	2 hr	2.5 hr	3 hr	3.5 hr	4 hr	Baseline
1	I	05-02-2021	S	60	64	60	68	70	70					130	120	100	118	114	114					99
2	S	06-02-2021	M	90	88	88	82	82	84	88				150	130	110	122	128	130	130				80
3	S	09-02-2021	K	88	90	90	80	82	80					140	120	120	120	120	120					84
4	I	18/02/2021	G	92	90	82	82	84	84	84				140	116	120	120	130	130	130				84
5	I	23/02/2021	R	98	90	90	88	82						130	110	112	120	120						72
6	S	04-03-2021	V	88	90	88	88	85	85					128	124	127	120	120	130					89
7	I	16/04/2021	Bd	80	78	82	81	82						130	132	128	128	134						90
8	I	16/04/2021	DD	90	80	80	80	80						130	130	110	120	120						82
9	S	21/04/2021	M	120	110	90	88	90	90					140	130	130	130	136	130					100
10	S	24/04/2021	PC	80	80	82	80	80	84					130	130	120	120	126	130					71
11	S	26/05/2021	S	110	100	99	98	100						120	110	100	110	120						75
12	I	22/06/2021	K	60	62	60	62	62	64					120	110	120	124	120	122					79
13	S	24/06/2021	BS	78	80	78	70	72	72					130	120	120	110	110	110					84
14	S	03-07-2021	US	89	80	78	80							130	120	120	128							100
15	S	03-07-2021	BR	90	88	84	84	84	85					140	140	130	130	130	130					104
16	I	06-07-2021	BD	88	88	80	80	80						130	130	120	120	120						92
17	I	15/07/2021	K	90	84	84	84	82	82	82	82	82		130	110	110	120	130	130	130	130	130		100
18	S	15/07/2021	SD	90	84	84	82	80	80	80				120	110	110	110	120	120	120				76
19	I	16/07/2021	JK	90	88	80	80	80						130	138	134	130	130						89
20	I	20/07/2021	SK	88	80	80	80	80	80	80				130	110	120	120	120	120	120				85
21	S	23/07/2021	SR	82	80	80	80	80	82	84				130	120	130	130	130	132	130				90

Sr. No	Randomization code	Enrollment date	Name	al Pressure (mmHg)									DBP (mmHg)										Oxygen Saturation (%)			
				0 min (initiation of block)	30 mins	1 hr	1.5 hr	2 hr	2.5 hr	3 hr	3.5 hr	4 hr	Baseline	0 min (initiation of block)	30 mins	1 hr	1.5 hr	2 hr	2.5 hr	3 hr	3.5 hr	4 hr	Baseline	0 min (initiation of block)	30 mins	1 hr
1	I	05-02-2021	S	95	68	70	70	71					70	70	55	60	64	66					96	97	96	96
2	S	06-02-2021	M	60	58	60	70	70	70				80	60	58	60	70	70	70				97	98	99	99
3	S	09-02-2021	K	72	70	74	68	67					90	80	70	80	70	70					96	97	96	97
4	I	18/02/2021	G	60	67	69	72	74	73				90	68	72	80	80	80	80				98	99	99	98
5	I	23/02/2021	R	65	68	70	72						78	70	70	70	80						99	99	98	98
6	S	04-03-2021	V	80	100	78	79	84					75	96	78	70	72	90					98	100	100	98
7	I	16/04/2021	Bd	90	85	82	91						80	81	78	74	80						98	98	99	98
8	I	16/04/2021	DD	82	75	77	78						80	80	70	70	70						98	98	98	98
9	S	21/04/2021	M	96	90	91	93	89					90	90	80	84	86	80					97	98	97	97
10	S	24/04/2021	PC	80	71	70	77	80					70	72	70	74	70	80					97	99	99	99
11	S	26/05/2021	S	71	69	70	75						70	60	60	70	70						98	98	97	98
12	I	22/06/2021	K	75	80	76	77	77					80	70	80	70	70	80					99	99	99	98
13	S	24/06/2021	BS	74	75	72	73	73					80	70	70	70	70	70					98	97	97	97
14	S	03-07-2021	US	96	96	95							80	70	72	70							97	98	97	97
15	S	03-07-2021	BR	100	96	95	95	90					90	80	80	80	80	70					97	98	98	98
16	I	06-07-2021	BD	90	85	86	86						80	70	70	70	70						98	98	99	98
17	I	15/07/2021	K	90	88	88	89	90	87	87	85		90	70	70	80	90	80	80	80	80		97	98	99	99
18	S	15/07/2021	SD	74	76	75	75	75	75				70	60	70	70	70	70	70				99	99	99	99
19	I	16/07/2021	JK	99	90	88	80						90	90	90	92	80						99	99	97	97
20	I	20/07/2021	SK	80	85	85	84	82	84				80	70	70	70	70	70	70				98	98	98	98
21	S	23/07/2021	SR	84	91	88	88	90	89				88	86	90	90	80	80	80				98	98	97	97

Sr. No	Randomization code	Enrollment date	Name							Respiratory Rate (per minute)										POST OPERATIVE VITALS Heart rate (bpm)											
				1.5 hr	2 hr	2.5 hr	3 hr	3.5 hr	4 hr	Baseline	0 min (initiation of block)	30 mins	1 hr	1.5 hr	2 hr	2.5 hr	3 hr	3.5 hr	4 hr	0	1	2	3	4	5	6	7	8	9	10	11	12
1	I	05-02-2021	S	97	97					16	18	18	16	16	16					80	70	64	68	70	68	68	74	90	78	70	70	70
2	S	06-02-2021	M	99	97	97				18	18	18	20	20	18	18				88	88	88	88	88	92	90	84	88	90	90	94	82
3	S	09-02-2021	K	97	97					18	20	18	18	18	18					70	70	72	72	72	72	80	88	82	82	82	82	84
4	I	18/02/2021	G	99	99	98				22	20	20	20	20	20	20				90	80	90	88	80	80	82	92	82	80	82	82	82
5	I	23/02/2021	R	98						22	21	22	22	22						82	82	84	82	82	80	80	80	80	80	72	72	74
6	S	04-03-2021	V	97	96					20	18	18	18	18	18					90	88	85	86	95	95	98	100	110	100	100	100	100
7	I	16/04/2021	Bd	99						15	16	16	16	16						78	80	80	80	82	76	84	86	90	80	82	86	86
8	I	16/04/2021	DD	98						16	16	16	16	16						80	80	80	72	70	70	70	70	70	70	70	85	80
9	S	21/04/2021	M	97	97					18	20	18	18	18	18					110	88	90	90	90	96	94	96	100	110	100	100	90
10	S	24/04/2021	PC	99	98					15	15	15	15	15	15					80	80	84	80	82	82	84	86	80	80	81	82	80
11	S	26/05/2021	S	98						22	20	22	22	22						100	98	##	98	90	##	##	100	100	98	90	96	96
12	I	22/06/2021	K	99	99					18	18	18	18	18	18					62	62	64	68	60	60	64	64	72	70	64	64	62
13	S	24/06/2021	BS	97	97					18	19	18	18	18	18					80	70	72	74	74	74	74	78	78	70	72	74	74
14	S	03-07-2021	US							18	18	18	18							80	80	80	82	80	80	80	80	82	84	80	82	84
15	S	03-07-2021	BR	98	98					20	20	20	20	18	18					88	84	85	84	84	84	84	82	82	84	82	84	82
16	I	06-07-2021	BD	98						20	20	20	20	20						88	80	82	90	86	86	84	84	84	82	80	80	80
17	I	15/07/2021	K	99	99	99	99	99		20	22	20	20	20	20	20	20	20		84	84	82	82	80	80	80	80	82	82	82	80	80
18	S	15/07/2021	SD	99	99	99				18	18	18	18	18	18	18				84	82	80	84	80	80	86	86	86	80	80	80	80
19	I	16/07/2021	JK	98						18	18	18	18	18						88	80	80	80	82	84	89	92	86	86	86	80	80
20	I	20/07/2021	SK	98	98	98				18	18	18	18	18	18	18				80	80	80	80	80	80	82	82	82	82	82	82	82
21	S	23/07/2021	SR	97	97	97				22	20	20	20	20	20	20				80	80	82	82	82	83	84	82	80	80	88	90	84

Sr. No	Randomization code	Enrollment date	Name												SBP (mm Hg)																		
				13	14	15	16	17	18	19	20	21	22	23	24	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	I	05-02-2021	S	70	70	70	72	78	78	80	98	82	70	70	64	140	120	110	120	120	130	130	130	120	120	120	120	120	120	130	130	120	120	130
2	S	06-02-2021	M	82	80	80	80	78	78	80	78	80	80	80	80	140	140	140	130	130	130	140	130	120	120	120	120	120	128	128	124	120	120	130
3	S	09-02-2021	K	70	70	70	74	72	74	76	77	78	70	74	72	110	100	100	100	100	100	100	110	110	110	110	114	120	114	100	120	120	110	120
4	I	18/02/2021	G	84	84	95	90	80	80	82	84	82	86	80	80	130	120	120	130	120	120	120	120	120	110	110	120	120	130	130	130	130	120	120
5	I	23/02/2021	R	72	72	74	70	72	70	70	74	74	72	72	72	130	120	120	130	130	120	120	110	110	110	110	120	118	114	122	122	120	120	120
6	S	04-03-2021	V	100	107	107	107	107	107	110	105	100	100	100	100	124	120	130	120	125	120	120	140	140	140	130	130	140	140	140	130	130	140	140
7	I	16/04/2021	Bd	86	84	86	94	80	80	80	78	78	80	82	85	132	128	130	134	124	120	124	120	128	130	132	124	120	124	120	130	138	130	130
8	I	16/04/2021	DD	78	70	70	70	70	70	70	75	78	75	75	75	130	120	120	110	110	110	110	120	120	120	120	120	120	120	120	120	120	120	120
9	S	21/04/2021	M	98	90	94	90	88	84	88	90	90	88	88	88	130	130	130	140	130	130	134	130	128	136	130	134	130	138	140	130	130	130	134
10	S	24/04/2021	PC	80	78	77	78	78	78	78	80	80	80	80	80	130	120	130	120	120	126	120	124	126	120	120	120	130	130	130	120	120	120	126
11	S	26/05/2021	S	90	90	90	100	99	90	90	88	88	90	92	92	110	110	110	120	120	120	120	120	120	120	130	120	120	120	120	120	120	120	120
12	I	22/06/2021	K	62	62	68	76	70	72	60	60	60	70	74	70	110	124	122	120	110	120	120	120	120	120	110	120	120	124	124	120	128	120	128
13	S	24/06/2021	BS	75	74	74	74	74	74	74	72	70	70	70	70	120	110	110	120	120	120	110	120	120	120	110	120	120	120	120	120	120	120	120
14	S	03-07-2021	US	84	85	84	80	82	85	86	80	80	80	78	78	120	128	120	130	120	120	120	110	120	124	120	120	120	120	120	120	120	120	120
15	S	03-07-2021	BR	82	84	82	84	85	86	87	88	88	89	90	88	140	130	130	130	130	130	130	130	130	130	130	130	120	120	120	120	120	130	130
16	I	06-07-2021	BD	80	80	80	80	80	84	86	82	82	82	82	82	130	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
17	I	15/07/2021	K	80	82	82	82	82	84	82	80	80	84	84	84	110	120	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
18	S	15/07/2021	SD	78	78	78	78	78	78	78	78	78	78	78	78	110	110	120	120	110	110	110	120	120	120	120	120	120	120	120	120	120	120	120
19	I	16/07/2021	JK	80	80	80	80	84	86	86	86	86	86	84	82	138	130	130	130	130	120	130	140	140	140	140	130	130	130	130	130	130	130	130
20	I	20/07/2021	SK	82	82	82	80	80	80	80	80	80	86	88	86	110	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
21	S	23/07/2021	SR	82	80	78	78	78	76	78	78	80	80	80	80	120	130	132	130	130	130	130	120	120	110	110	120	120	120	120	120	120	120	120

Sr. No	Randomization code	Enrollment date	Name							DBP (mm Hg)																								Oxygen Saturation (%)									
				19	20	21	22	23	24	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	0	1	2	3	4	5	6	7	8	9
1	I	05-02-2021	S	130	130	120	110	120	120	70	70	70	70	70	70	70	80	70	70	70	70	70	70	70	70	70	70	80	80	80	70	70	70	70	97	97	97	97	96	96	97	96	96	96
2	S	06-02-2021	M	130	130	130	130	124	122	80	80	70	70	60	60	70	70	70	60	60	60	64	68	68	64	68	70	70	72	78	80	70	74	72	97	97	97	97	97	98	98	97	97	99
3	S	09-02-2021	K	110	110	110	100	120	110	70	60	60	60	70	70	70	80	80	60	64	68	80	72	68	62	78	70	72	70	68	60	60	64	60	98	98	98	98	97	97	97	97	97	98
4	I	18/02/2021	G	110	100	110	120	120	120	80	80	80	80	70	70	70	70	70	70	70	80	80	80	70	90	70	80	80	70	70	70	80	80	80	98	98	98	98	98	99	99	99	98	98
5	I	23/02/2021	R	116	112	110	120	120	120	80	80	80	80	80	70	70	70	70	70	70	70	72	76	78	78	80	70	70	72	72	70	70	72	72	99	98	98	98	98	98	97	98	99	97
6	S	04-03-2021	V	140	140	140	140	140	130	96	70	90	85	85	80	75	70	80	75	80	78	80	80	75	75	75	78	80	80	80	80	80	80	80	100	98	96	96	96	97	97	97	97	98
7	I	16/04/2021	Bd	130	120	128	128	120	122	81	74	80	80	80	70	72	70	78	80	84	80	80	82	86	86	80	78	78	74	70	72	70	70	72	98	98	98	98	97	97	97	97	97	98
8	I	16/04/2021	DD	120	120	120	120	120	120	80	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	98	98	98	98	98	98	98	98	98	98
9	S	21/04/2021	M	130	130	136	140	130	130	90	84	80	90	80	70	72	70	70	78	72	74	70	80	80	80	70	76	70	70	70	76	80	80	80	97	97	97	97	97	97	97	97	97	97
10	S	24/04/2021	PC	126	120	130	130	120	120	70	74	80	70	80	86	80	84	80	70	70	70	70	70	80	80	70	78	76	70	70	76	80	80	82	97	99	98	98	98	98	99	97	97	97
11	S	26/05/2021	S	120	120	120	120	120	120	71	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	98	97	97	97	97	97	97	97	97	97
12	I	22/06/2021	K	120	110	120	120	120	120	70	70	80	80	70	80	80	80	70	80	70	80	80	84	84	80	88	80	88	80	70	80	80	70	70	99	98	99	98	98	98	98	98	98	98
13	S	24/06/2021	BS	120	120	120	120	120	120	70	70	70	80	80	70	70	70	70	70	70	70	80	80	80	80	80	80	80	80	80	80	70	70	70	97	97	97	97	98	98	97	97	97	97
14	S	03-07-2021	US	120	120	120	120	120	120	70	70	70	80	80	80	80	60	70	70	70	70	70	70	80	80	80	70	60	70	70	60	60	70	80	98	97	98	97	98	98	98	98	98	98
15	S	03-07-2021	BR	130	130	130	130	130	130	80	80	70	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	70	70	80	80	80	80	80	98	98	98	98	98	98	98	98	97	97
16	I	06-07-2021	BD	120	120	120	120	120	120	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	80	80	98	98	98	98	97	99	98	99	99	99
17	I	15/07/2021	K	130	130	130	130	130	130	70	80	90	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	98	99	99	99	99	99	99	99	99	99
18	S	15/07/2021	SD	120	120	120	120	120	120	60	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	99	99	99	98	98	98	98	99	99	99
19	I	16/07/2021	JK	130	140	140	140	140	140	90	92	80	80	80	80	80	80	80	90	80	90	90	70	80	80	80	80	80	80	90	90	80	80	80	99	97	97	96	96	96	97	97	97	97
20	I	20/07/2021	SK	120	120	120	120	120	120	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	98	98	98	98	98	98	98	98	98	98
21	S	23/07/2021	SR	120	120	120	120	130	130	86	90	80	80	70	70	70	70	70	60	70	70	70	70	70	70	70	70	70	70	70	70	70	80	80	98	97	97	97	97	97	97	97	97	97

Sr. No	Randomization code	Enrollment date	Name															NRS																								Time of first rescue a				
				10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	0	1	2	3	4
1	I	05-02-2021	S	96	96	97	97	97	97	97	97	96	96	96	96	96	96	97	0	0	0	0	2	3	3	3	6	0	0	2	2	2	2	3	3	3	3	3	8	0	2	3	3					
2	S	06-02-2021	M	97	99	99	99	97	97	97	97	97	97	98	98	97	97	97	0	0	0	0	0	0	0	0	2	2	2	2	1	2	2	2	2	1	1	1	2	2	1	1	1					
3	S	09-02-2021	K	98	98	98	98	98	98	98	98	98	97	96	96	98	98	98	0	0	0	0	2	3	3	5	0	0	0	0	0	0	0	0	0	2	2	2	2	2	1	2	2					
4	I	18/02/2021	G	99	100	99	98	98	98	97	97	98	97	99	99	100	99	100	0	0	0	0	2	3	2	6	0	0	0	2	3	2	2	7	0	0	0	0	0	2	2	2	2					
5	I	23/02/2021	R	97	98	99	99	99	99	99	99	98	98	98	98	98	98	98	0	0	0	0	2	0	0	0	0	0	2	2	1	0	0	0	0	0	0	0	2	2	0	1	1					
6	S	04-03-2021	V	98	97	97	97	97	97	97	97	97	97	97	97	97	97	97	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
7	I	16/04/2021	Bd	98	99	99	99	98	98	98	97	97	97	97	97	98	98	98	0	0	0	1	1	1	3	3	4	2	2	2	2	3	3	3	4	2	2	1	1	1	1	1	1					
8	I	16/04/2021	DD	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	0	0	0	0	0	1	1	2	2	2	2	5	2	2	1	1	1	1	1	1	0	0	0	0	0					
9	S	21/04/2021	M	97	98	98	97	97	97	98	97	97	98	98	98	98	97	97	0	0	1	1	1	1	2	3	3	7	3	3	3	3	2	3	6	3	2	1	1	1	1	1	1					
10	S	24/04/2021	PC	99	97	98	97	99	97	97	97	98	98	98	97	97	97	97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	1	1	0					
11	S	26/05/2021	S	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	2	2	2	2	2	2	5	3	2	2	1	1	1	2	3	3	6	3	2	1	1	1	1	1	1					
12	I	22/06/2021	K	98	98	98	98	98	98	98	99	99	99	98	98	98	99	99	0	0	0	0	2	3	3	3	4	3	2	2	2	2	2	2	6	3	2	2	0	0	3	3	6					
13	S	24/06/2021	BS	97	97	97	97	97	97	97	97	97	97	97	98	98	97	98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	1	1	1					
14	S	03-07-2021	US	98	97	97	97	97	97	97	97	98	98	97	97	97	97	97	0	0	0	0	1	1	1	1	1	2	2	2	2	1	1	1	1	0	0	0	0	1	1	2	2					
15	S	03-07-2021	BR	99	98	98	98	98	98	98	97	98	98	98	98	98	98	98	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3	2					
16	I	06-07-2021	BD	99	99	99	99	99	98	98	98	98	98	98	98	98	98	98	0	0	2	6	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1			1st		
17	I	15/07/2021	K	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	0	0	0	0	0	2	2	2	4	2	2	2	2	3	3	3	6	3	3	3	2	2	2	3	5					
18	S	15/07/2021	SD	99	99	99	99	99	99	99	98	98	98	98	98	98	98	98	0	0	2	2	2	3	7	3	2	2	2	1	1	1	1	1	1	1	1	1	1	0	0	0	0					
19	I	16/07/2021	JK	98	98	99	99	99	99	99	99	99	98	98	98	98	98	98	0	0	0	0	1	1	3	7	2	2	2	2	2	1	1	1	3	3	5	2	2	2	1	1	1					
20	I	20/07/2021	SK	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	0	1	1	1	1	2	2	2	2	2	2	4	2	0	0	0	1	1	1	2	2	3	3	4	2					
21	S	23/07/2021	SR	97	97	97	97	97	97	97	97	97	97	98	98	98	98	98	0	0	0	0	2	2	2	2	0	2	3	6	0	2	2	2	0	0	0	0	0	1	1	1	1					

Sr. No	Randomization code	Enrollment date	Name	nalgesic given (minutes)																					Amount of analgesic given (mg)											
				5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	0	1	2	3	4	5	6	7	8	9	10	11	12
1	I	05-02-2021	S				1st												2nd													50				
2	S	06-02-2021	M																																	
3	S	09-02-2021	K			1st																									50					
4	I	18/02/2021	G			1st								2nd																	50					
5	I	23/02/2021	R																																	
6	S	04-03-2021	V																																	
7	I	16/04/2021	Bd				1st								2nd																	50				
8	I	16/04/2021	DD							1st																								50		
9	S	21/04/2021	M				1st								2nd																	50				
10	S	24/04/2021	PC																																	
11	S	26/05/2021	S		1st									2nd																50						
12	I	22/06/2021	K				1st								2nd								3rd									50				
13	S	24/06/2021	BS																																	
14	S	03-07-2021	US																																	
15	S	03-07-2021	BR																																	
16	I	06-07-2021	BD																								50									
17	I	15/07/2021	K				1st								2nd								3rd									50				
18	S	15/07/2021	SD		1st																									50						
19	I	16/07/2021	JK			1st											2nd														50					
20	I	20/07/2021	SK							1st												2nd												50		
21	S	23/07/2021	SR							1st																								50		

Sr. No	Randomization code	Enrollment date	Name	13	14	15	16	17	18	19	20	21	22	23	24	Total amount of rescue analgesic used in 24 hours period	Time at which NRS Score is ≥ 4 for the first time post-operatively	Total Duration of analgesia of FICB	Postop nausea and vomiting (within 24 hrs)	Any other postop complication (?)	Overall patient satisfaction for pain management (within 24 hrs)
1	I	05-02-2021	S								50					100mg	8th hour	8 hours	none	none	Neither satisfied nor dissatisfied
2	S	06-02-2021	M													0	never	24hours	none	none	Very satisfied
3	S	09-02-2021	K													50mg	7th hour	7hours	none	none	Very satisfied
4	I	18/02/2021	G			50										100mg	7th hour	7 hours	none	none	Satisfied
5	I	23/02/2021	R													0	never	24hours	none	none	Very satisfied
6	S	04-03-2021	V													0	never	24hours	none	none	Very satisfied
7	I	16/04/2021	Bd				50									100mg	8th hour	8 hours	none	none	Satisfied
8	I	16/04/2021	DD													50mg	11th hour	11hours	none	none	Very satisfied
9	S	21/04/2021	M				50									100mg	8th hour	8 hours	none	none	Neither satisfied nor dissatisfied
10	S	24/04/2021	PC													0	never	24hours	none	none	Very satisfied
11	S	26/05/2021	S			50										100mg	6th hour	6 hours	none	none	Neither satisfied nor dissatisfied
12	I	22/06/2021	K				50								50	150mg	8th hour	8 hours	none	none	Neither satisfied nor dissatisfied
13	S	24/06/2021	BS													0	never	24 hours	none	none	Very satisfied
14	S	03-07-2021	US													0	never	24 hours	none	none	Very satisfied
15	S	03-07-2021	BR													0	never	24hours	none	none	Satisfied
16	I	06-07-2021	BD													50mg	3rd hour	3 hours	none	none	Very satisfied
17	I	15/07/2021	K				50								50	150mg	8th hour	8 hours	none	none	Dissatisfied
18	S	15/07/2021	SD													50mg	6th hour	6 hours	none	none	Neither satisfied nor dissatisfied
19	I	16/07/2021	JK						50							100mg	7th hour	7 hours	none	none	Neither satisfied nor dissatisfied
20	I	20/07/2021	SK											50		100mg	11th hour	11hours	none	none	Neither satisfied nor dissatisfied
21	S	23/07/2021	SR													50mg	11th hour	11hours	none	none	Satisfied

Sr. No	Randomization code	Enrollment date	Name	MRD No	Age	Gender	Weight	Height	BMI	Type of Lower Limb surgery	ASA grade	Time of Subarachnoid Block	Level of sensory blockade	Level of motor blockade (Modified Bromage Scale)	Time of institution of FICB block	Duration of surgery in minutes (time from skin incision to closure)
22	I	26/07/2021	AC	1142450	65	Male	78	172	26.4	Proximal Femur Nailing	3	11:20	T10	3	11:30 AM	45
23	I	27/08/2021	SS	879728	78	Male	75	172	25.4	Hemiarthroplasty	3	12:00 PM	T10	3	12:15 PM	120
24	I	28/08/2021	SB	850981	73	Female	65	157	26.4	Proximal Femur Nailing	3	9:20 AM	T10	3	9:30 AM	60
25	S	07-09-2021	KS	1168668	56	Female	80	167	28.7	Proximal Femur Nailing	2	1:35 PM	T8	3	1:45 PM	90
26	I	14/09/2021	MD	1172799	68	Female	64	160	25.0	Hemiarthroplasty	3	10:00 AM	T10	3	10:15 AM	120
27	I	21/09/2021	RJ	1169849	57	Male	88	182	26.6	Distal femur nailing	3	10:20 AM	T10	3	10:30 AM	70
28	I	23/09/2021	DK	1167571	75	Male	80	172	27.0	Hemiarthroplasty	3	09:15	T8	3	9:30 AM	110
29	I	23/09/2021	SD	1175684	61	Female	62	154	26.1	Proximal Femur Nailing	2	9:20 AM	T10	3	9:30 AM	100
30	S	02-11-2021	BD	955547	68	Male	72	170	24.9	Hemiarthroplasty	3	1:25 PM	T8	3	1:30 PM	75
31	I	11-05-2021	TR	1201491	76	Male	75	165	27.5	Proximal Femur Nailing	3	10:10 AM	T8	3	10:15 AM	60
32	S	11-09-2021	MS	610793	81	Male	80	162	30.5	Proximal Femur Nailing	3	12:20	T10	3	12:30 PM	100
33	I	11-11-2021	K	1204874	60	Female	72	157	29.2	Hemiarthroplasty	2	12:10 PM	T8	3	12:15 PM	60
34	S	13/11/2021	RB	1090331	59	Female	65	162	24.8	Hemiarthroplasty	3	12:25 PM	T8	3	12:30 PM	100
35	I	25/11/2021	SK	1213340	85	Female	65	154	27.4	Proximal Femur Nailing	3	9:25 AM	T10	3	9:30 AM	90
36	I	25/11/2021	PK	344749	72	Female	68	157	27.6	Proximal Femur Nailing	3	9:25 AM	T8	3	9:30 AM	90
37	I	25/11/2021	SK	1213571	69	Female	70	152	30.3	Proximal Femur Nailing	3	3:35 PM	T8	3	3:45 PM	60
38	I	29/11/2021	RP	1215813	83	Female	60	157	24.3	Proximal Femur Nailing	3	2:50 PM	T8	3	3:00 PM	60
39	I	30/11/2021	SR	1215854	60	Female	64	157	26.0	Proximal Femur Nailing	3	12:20 PM	T10	3	12:30 PM	60
40	I	12-08-2021	GS	1220243	66	Male	82	172	27.7	Proximal Femur Nailing	2	9:55 AM	T10	3	10:00 AM	60
41	S	23/12/2021	S	1228034	73	Female	65	154	27.4	Hemiarthroplasty	3	9:20 AM	T10	3	9:30 AM	120
42	S	28/12/2021	K	1228867	15	Female	56	160	21.9	excision	1	9:05 AM	T8	3	9:15 AM	90
43	S	24/01/2022	B	1243099	65	Male	78	175	25.5	Proximal Femur Nailing	3	10:55 AM	T8	3	11:00 AM	60
44	S	03-02-2022	A	1247934	63	Male	75	170	26.0	Proximal Femur Nailing	2	12:25 PM	T10	3	12:30 PM	70
45	S	02-03-2022	RD	1247920	86	Male	77	170	26.6	Proximal Femur Nailing	3	2:15 PM	T8	3	2:20 PM	90
46	S	03-02-2022	AS	1247745	57	Male	66	172	22.3	Proximal Femur Nailing	3	8:25 PM	T10	3	8:30 PM	50
47	S	05-02-2022	D	1244682	71	Female	60	154	25.3	Proximal Femur Nailing	3	9:50 AM	T8	3	10:00 AM	60
48	S	10-02-2022	HK	1250701	77	Female	62	162	23.6	Proximal Femur Nailing	3	9:10 AM	T10	3	9:15 AM	60
49	S	16/02/2022	TJ	1252454	88	Female	70	152	30.3	Proximal Femur Nailing	3	9:50 AM	T10	3	10:00 AM	100
50	S	24/02/2022	TK	1258913	83	Female	65	157	26.4	Proximal Femur Nailing	3	11:55 AM	T8	3	12:00 PM	60

Sr. No	Randomization code	Enrollment date	Name	INTRA OPERATIVE VITALS																					
				Heart Rate (bpm)										SBP (mmHg)											Mean Arteri
				Baseline	0 min (initiation of block)	30 mins	1 hr	1.5 hr	2 hr	2.5 hr	3 hr	3.5 hr	4 hr	Baseline	0 min (initiation of block)	30 mins	1 hr	1.5 hr	2 hr	2.5 hr	3 hr	3.5 hr	4 hr	Baseline
22	I	26/07/2021	AC	88	84	84	82	82						140	120	140	140	140						96
23	I	27/08/2021	SS	80	72	70	68	68	68	68	68			130	110	110	120	120	130	130	130			80
24	I	28/08/2021	SB	94	88	88	80	80	80					130	130	130	130	130	130					85
25	S	07-09-2021	KS	92	88	85	85	86	85					140	130	128	130	130	130					86
26	I	14/09/2021	MD	69	65	64	65	65	65	65				130	110	110	120	120	120	120				88
27	I	21/09/2021	RJ	90	85	80	80	80	80					120	110	120	120	120	120					82
28	I	23/09/2021	DK	92	88	88	85	85	85	85				140	130	120	120	120	120	120				96
29	I	23/09/2021	SD	100	92	88	90	90	88	88				150	140	120	130	130	130	130				108
30	S	02-11-2021	BD	80	80	80	78	78	78					140	110	120	120	120	120					78
31	I	11-05-2021	TR	78	70	70	70	70						140	130	120	120	120						87
32	S	11-09-2021	MS	70	68	65	65	65	65	65				140	120	120	120	120	120	120				80
33	I	11-11-2021	K	100	80	80	80	80	80					160	130	120	120	130	120					100
34	S	13/11/2021	RB	68	79	70	72	72	70	65				150	120	120	130	130	130	130				100
35	I	25/11/2021	SK	98	85	80	85	85	85					150	120	120	120	130	130					89
36	I	25/11/2021	PK	70	68	65	65	65	62					120	100	100	110	110	110					72
37	I	25/11/2021	SK	88	80	70	70	70						130	110	130	130	130						78
38	I	29/11/2021	RP	110	80	82	80	80						160	130	110	130	130						110
39	I	30/11/2021	SR	90	80	80	80	80						130	120	120	120	120						82
40	I	12-08-2021	GS	78	75	72	75	75	75					150	130	110	130	130	130					95
41	S	23/12/2021	S	80	75	75	80	75	75	80	80			180	150	120	130	130	130	130	130			110
42	S	28/12/2021	K	100	85	85	85	84	85					130	120	110	120	120	120					103
43	S	24/01/2022	B	110	98	90	88	88	88					150	130	120	120	120	120					110
44	S	03-02-2022	A	96	90	85	85	85	85					140	120	120	120	120	120					108
45	S	02-03-2022	RD	90	80	80	80	80	80					130	110	120	120	120	130					99
46	S	03-02-2022	AS	120	100	98	90	90						160	120	120	130	130						115
47	S	05-02-2022	D	90	85	85	85	80						130	120	120	120	120						88
48	S	10-02-2022	HK	104	92	90	88	88	89					160	110	120	120	130	130					118
49	S	16/02/2022	TJ	98	88	84	88	86	88	86				140	120	100	120	120	120	120				99
50	S	24/02/2022	TK	90	80	80	80	80	80					150	120	110	120	120	120					108

Sr. No	Randomization code	Enrollment date	Name	al Pressure (mmHg)									DBP (mmHg)									Oxygen Saturation (%)			
				0 min (initiation of block)	30 mins	1 hr	1.5 hr	2 hr	2.5 hr	3 hr	3.5 hr	4 hr	Baseline	0 min (initiation of block)	30 mins	1 hr	1.5 hr	2 hr	2.5 hr	3 hr	3.5 hr	4 hr	Baseline	0 min (initiation of block)	30 mins	1 hr
22	I	26/07/2021	AC	89	98	94	96						90	60	90	80	80						97	97	97	97
23	I	27/08/2021	SS	71	68	74	75	77	77	77			80	70	60	70	78	80	80	80			97	97	97	97
24	I	28/08/2021	SB	80	80	80	80	80					80	70	70	70	70	70					99	99	98	98
25	S	07-09-2021	KS	80	70	84	83	81					90	80	60	90	88	80					98	97	98	98
26	I	14/09/2021	MD	76	78	78	80	80	80				70	60	70	60	70	70	70				98	98	98	98
27	I	21/09/2021	RJ	74	78	78	79	78					80	60	70	70	70	70					98	98	98	98
28	I	23/09/2021	DK	90	87	85	85	82	82				90	80	80	80	80	70	70				99	98	98	98
29	I	23/09/2021	SD	100	95	92	90	91	90				90	80	70	80	80	80	80				99	99	99	99
30	S	02-11-2021	BD	72	75	75	75	75					80	70	70	70	70	70					98	98	98	98
31	I	11-05-2021	TR	80	78	78	78						90	70	70	70	70						97	97	97	97
32	S	11-09-2021	MS	68	70	72	75	75	74				70	60	70	70	80	80	80				96	96	96	96
33	I	11-11-2021	K	85	70	75	75	75					80	70	60	70	70	70					98	98	98	98
34	S	13/11/2021	RB	96	90	96	94	94	94				90	80	80	80	80	80	80				97	97	97	97
35	I	25/11/2021	SK	85	80	81	89	85					80	70	70	70	80	80					99	99	98	98
36	I	25/11/2021	PK	65	67	67	67	65					70	60	60	70	70	70					97	97	97	97
37	I	25/11/2021	SK	60	80	80	80						70	50	70	70	70						97	97	97	97
38	I	29/11/2021	RP	90	80	90	90						100	80	70	80	70						97	97	97	97
39	I	30/11/2021	SR	75	75	74	74						80	70	70	70	70						99	99	99	99
40	I	12-08-2021	GS	80	75	80	80	80					90	80	80	80	80	80					98	98	98	98
41	S	23/12/2021	S	100	98	99	95	95	95	95			90	80	80	80	80	80	80	80			98	98	98	98
42	S	28/12/2021	K	98	90	98	95	92					90	80	60	80	80	80					98	98	98	98
43	S	24/01/2022	B	100	100	95	95	96					90	70	70	70	70	70					99	99	99	99
44	S	03-02-2022	A	90	88	92	88	89					80	70	60	70	70	70					97	97	97	97
45	S	02-03-2022	RD	82	88	85	85	86					90	70	70	70	70	80					98	98	98	98
46	S	03-02-2022	AS	100	102	105	100						90	80	80	80	80						97	97	97	97
47	S	05-02-2022	D	78	78	78	78						80	70	70	70	70						98	98	98	98
48	S	10-02-2022	HK	78	82	82	85	86					100	80	80	80	80	80					97	97	97	97
49	S	16/02/2022	TJ	82	68	84	84	85	80				90	80	70	80	80	80	70				96	96	97	96
50	S	24/02/2022	TK	80	72	82	85	75					90	70	60	80	80	70					97	97	97	97

Sr. No	Randomization code	Enrollment date	Name																POST OPERATIVE VITALS											
				Respiratory Rate (per minute)															Heart rate (bpm)											
				1.5 hr	2 hr	2.5 hr	3 hr	3.5 hr	4 hr	Baseline	0 min (initiation of block)	30 mins	1 hr	1.5 hr	2 hr	2.5 hr	3 hr	3.5 hr	4 hr	0	1	2	3	4	5	6	7	8	9	10	11	12
22	I	26/07/2021	AC	97						18	18	18	18	18						84	82	85	86	86	86	86	86	88	88	88	90	90
23	I	27/08/2021	SS	97	97	97	97			18	18	18	18	18	18	18	18			72	68	68	68	68	68	68	68	68	68	64	62	60
24	I	28/08/2021	SB	98	98					18	18	18	18	18	18					88	80	80	80	80	88	88	88	84	84	84	84	84
25	S	07-09-2021	KS	98	98					20	20	20	20	20	20					88	85	85	85	85	85	85	88	90	90	90	84	80
26	I	14/09/2021	MD	98	98	98				20	20	20	20	20	20	20				65	65	65	66	70	70	70	70	70	70	70	68	68
27	I	21/09/2021	RJ	98	98					18	18	18	18	18	18					85	80	80	80	85	85	90	87	87	85	85	86	86
28	I	23/09/2021	DK	98	98	98				18	18	18	18	18	18	18				88	85	85	84	84	85	85	85	85	85	86	90	88
29	I	23/09/2021	SD	99	99	99				18	18	18	18	18	18	18				92	90	88	85	88	88	88	88	88	85	82	80	80
30	S	02-11-2021	BD	98	98					18	18	18	18	18	18					80	78	78	78	78	75	75	75	75	75	75	75	75
31	I	11-05-2021	TR	97						18	18	18	18	18						70	70	70	70	70	70	70	70	70	70	70	70	70
32	S	11-09-2021	MS	96	96	96				17	17	17	17	17	17	17				68	65	65	65	65	60	60	60	60	60	60	60	60
33	I	11-11-2021	K	98	98					18	18	18	18	18	18					80	80	80	80	80	85	87	87	90	85	85	85	80
34	S	13/11/2021	RB	97	97	97				16	16	16	16	16	16	16				79	72	70	70	70	70	70	70	70	75	82	70	68
35	I	25/11/2021	SK	98	98					16	16	16	16	16	16					85	85	85	80	80	80	80	80	85	85	85	90	95
36	I	25/11/2021	PK	97	97					18	18	18	18	18	18					68	65	62	62	62	60	60	60	60	60	70	68	68
37	I	25/11/2021	SK	97						18	18	18	18	18						80	70	70	80	70	70	70	78	85	80	70	70	70
38	I	29/11/2021	RP	97						16	16	16	16	16						80	80	80	80	84	88	88	84	80	80	80	80	80
39	I	30/11/2021	SR	99						18	18	18	18	18						80	80	80	80	80	80	80	80	80	80	80	80	80
40	I	12-08-2021	GS	98	98					18	18	18	18	18	18					75	75	75	78	78	78	78	75	75	78	85	80	80
41	S	23/12/2021	S	98	98	98	98			16	16	16	16	16	16	16	16			75	80	75	80	80	80	80	80	80	80	80	80	80
42	S	28/12/2021	K	98	98					16	16	16	16	16	16					85	85	85	87	88	80	80	80	80	85	88	98	88
43	S	24/01/2022	B	99	99					18	18	18	18	18	18					98	88	88	80	80	80	80	80	80	80	80	80	80
44	S	03-02-2022	A	97	97					18	18	18	18	18	18					90	85	85	85	85	85	85	85	85	92	90	88	85
45	S	02-03-2022	RD	98	98					16	16	16	16	16	16					80	80	80	80	85	88	90	95	90	85	85	85	85
46	S	03-02-2022	AS	97						18	18	18	18	18						100	90	88	80	80	80	80	80	80	85	88	95	100
47	S	05-02-2022	D	98						18	18	18	18	18						85	85	85	85	85	85	80	80	80	80	80	80	80
48	S	10-02-2022	HK	97	97					18	18	18	18	18	18					92	88	89	90	88	88	89	90	94	94	95	95	96
49	S	16/02/2022	TJ	96	96	97				18	18	18	18	18	18	18				88	88	88	84	84	85	85	85	85	85	85	85	85
50	S	24/02/2022	TK	97	97					16	16	16	16	16	16					80	80	80	75	75	78	78	80	80	86	85	85	80

Sr. No	Randomization code	Enrollment date	Name																															
															SBP (mm Hg)																				
				13	14	15	16	17	18	19	20	21	22	23	24	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
22	I	26/07/2021	AC	90	90	86	86	84	84	88	90	90	90	86	84	120	140	140	140	130	140	140	140	140	140	130	130	130	130	130	130	130	130	130
23	I	27/08/2021	SS	60	60	60	60	60	60	60	68	70	70	70	70	110	120	130	130	130	120	120	120	120	120	120	120	120	120	120	120	120	130	120
24	I	28/08/2021	SB	88	90	92	88	84	80	80	80	80	80	80	80	130	130	130	130	130	130	130	130	130	130	130	120	120	120	130	130	130	120	120
25	S	07-09-2021	KS	80	80	80	80	80	80	80	80	85	85	85	86	130	130	130	130	120	120	120	120	130	130	130	130	130	120	120	120	120	120	120
26	I	14/09/2021	MD	68	68	68	65	65	65	65	65	65	65	65	65	110	120	120	120	120	120	120	120	120	120	120	120	120	120	120	110	110	110	110
27	I	21/09/2021	RJ	88	95	90	85	85	85	88	88	92	87	85	85	110	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
28	I	23/09/2021	DK	85	85	85	85	85	85	85	85	88	94	90	84	130	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
29	I	23/09/2021	SD	80	80	80	80	80	80	80	85	80	82	82	82	140	130	130	130	130	130	130	130	130	130	130	130	120	120	120	120	120	120	120
30	S	02-11-2021	BD	75	75	75	75	75	75	75	75	75	75	75	75	110	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
31	I	11-05-2021	TR	70	70	70	70	70	70	70	70	70	70	70	70	130	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
32	S	11-09-2021	MS	60	60	60	60	60	60	65	70	70	70	68	65	120	120	120	130	120	120	120	120	120	120	110	110	120	120	120	120	120	120	120
33	I	11-11-2021	K	80	75	75	75	75	75	75	75	80	80	80	80	130	120	120	120	130	130	130	130	130	130	120	120	120	120	120	120	120	120	120
34	S	13/11/2021	RB	68	68	68	68	74	74	80	74	72	70	70	70	120	130	130	130	130	120	120	120	120	120	120	120	130	110	130	110	110	110	120
35	I	25/11/2021	SK	90	90	85	80	80	80	75	76	76	76	80	80	120	120	130	120	120	120	120	120	120	120	130	130	130	130	130	130	130	120	120
36	I	25/11/2021	PK	65	65	65	65	65	65	65	65	65	65	65	65	100	110	110	110	120	110	110	110	100	100	110	110	110	110	110	110	110	110	100
37	I	25/11/2021	SK	70	70	82	88	82	85	70	70	80	80	80	80	110	130	130	130	130	130	130	130	130	130	130	130	130	130	120	120	120	120	120
38	I	29/11/2021	RP	80	80	85	86	85	85	85	85	88	88	85	85	130	130	130	120	120	130	130	120	130	130	130	130	120	120	120	120	120	130	130
39	I	30/11/2021	SR	80	80	80	80	80	80	80	80	80	80	80	80	120	120	120	120	120	120	110	110	110	110	110	110	110	110	110	110	110	110	110
40	I	12-08-2021	GS	80	75	75	70	70	70	70	75	78	75	75	75	130	130	130	130	130	120	120	120	120	120	120	120	120	120	120	120	120	120	120
41	S	23/12/2021	S	80	80	80	80	80	80	80	80	80	80	80	80	150	130	130	130	130	120	120	120	120	120	120	120	120	120	120	120	120	120	120
42	S	28/12/2021	K	88	82	82	80	80	80	80	80	80	80	80	80	120	120	120	120	120	120	120	120	120	120	130	130	130	130	120	120	110	110	110
43	S	24/01/2022	B	80	80	80	80	80	80	80	80	80	80	80	80	130	120	120	120	120	120	130	130	130	130	130	130	120	120	120	120	120	120	120
44	S	03-02-2022	A	85	80	80	80	82	82	88	88	88	88	88	88	120	120	120	120	120	120	120	120	130	130	130	130	130	120	120	120	120	120	130
45	S	02-03-2022	RD	85	85	85	85	80	85	85	85	85	85	85	85	110	120	130	130	130	130	1E+05	130	130	130	120	120	120	120	120	120	130	130	130
46	S	03-02-2022	AS	90	85	85	85	85	85	85	85	85	85	85	85	120	130	130	130	130	130	120	120	120	120	120	120	130	130	130	120	120	120	120
47	S	05-02-2022	D	80	80	80	80	80	80	80	80	80	85	85	85	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	110	110
48	S	10-02-2022	HK	95	95	90	85	85	85	85	85	85	88	90	90	110	120	130	130	130	130	130	130	130	130	130	130	130	130	120	120	120	120	120
49	S	16/02/2022	TJ	85	85	85	85	85	85	85	85	85	85	85	85	120	120	120	110	110	110	120	120	120	120	120	120	120	120	120	120	120	120	120
50	S	24/02/2022	TK	80	78	78	75	75	75	75	75	80	80	80	80	120	120	120	120	120	110	110	110	120	120	120	120	120	120	110	110	110	110	110

Sr. No	Randomization code	Enrollment date	Name	DBP (mm Hg)																																		Oxygen Saturation (%)									
				19	20	21	22	23	24	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	0	1	2	3	4	5	6	7	8	9
22	I	26/07/2021	AC	130	130	130	130	130	140	60	80	80	80	80	90	90	90	90	90	90	80	80	80	80	90	80	80	80	80	80	80	80	80	90	97	97	97	97	97	97	97	96	96	96
23	I	27/08/2021	SS	120	120	120	120	120	120	70	70	80	80	70	70	70	70	70	70	70	60	60	60	60	60	60	70	70	70	70	70	70	70	70	97	97	97	97	97	97	97	97	97	97
24	I	28/08/2021	SB	120	120	120	120	120	120	70	70	70	70	70	80	80	80	80	80	80	80	80	70	80	80	80	70	70	70	70	70	70	70	70	99	98	98	98	98	98	98	98	98	98
25	S	07-09-2021	KS	120	130	130	130	130	130	80	90	80	70	70	70	70	60	70	70	70	80	80	60	60	70	70	70	80	80	80	80	80	80	80	97	98	98	98	98	98	98	98	98	98
26	I	14/09/2021	MD	110	110	110	110	110	110	60	60	70	70	70	60	70	70	80	70	70	70	70	60	60	70	70	70	70	70	70	70	70	70	70	98	98	98	98	98	98	98	98	98	98
27	I	21/09/2021	RJ	120	120	120	120	120	120	60	70	70	70	70	70	60	60	60	70	70	70	70	70	80	60	60	60	60	60	60	70	80	80	80	98	98	98	98	98	98	98	98	98	98
28	I	23/09/2021	DK	120	120	120	120	120	120	80	80	70	70	70	70	70	60	60	60	70	70	70	70	60	60	60	60	60	60	60	60	70	70	70	98	98	98	98	98	97	97	98	98	98
29	I	23/09/2021	SD	120	120	120	120	120	120	80	80	80	80	80	80	80	80	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	99	99	99	99	99	99	99	99	99	99
30	S	02-11-2021	BD	120	120	120	120	120	120	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	98	98	98	98	98	98	98	98	98	98
31	I	11-05-2021	TR	120	120	120	120	120	120	70	70	70	70	707	70	70	70	80	80	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	97	97	97	97	97	97	97	97	97	97
32	S	11-09-2021	MS	120	120	120	120	120	120	60	70	80	80	80	80	80	80	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	96	96	96	97	96	96	96	96	96	96
33	I	11-11-2021	K	120	120	120	120	120	120	70	70	70	70	80	80	70	70	70	70	70	60	70	70	70	70	70	70	70	70	70	70	70	70	70	98	98	98	98	98	98	98	98	98	98
34	S	13/11/2021	RB	130	120	120	110	110	110	80	80	80	80	80	80	70	70	70	70	70	70	80	70	80	70	70	70	70	80	70	60	70	70	70	97	97	97	97	97	97	97	97	97	97
35	I	25/11/2021	SK	120	120	120	120	120	120	70	70	80	80	70	70	70	80	80	80	70	80	80	80	70	70	70	70	70	60	60	70	70	70	70	99	98	98	98	98	98	98	98	98	98
36	I	25/11/2021	PK	100	110	110	110	110	110	60	70	70	70	60	70	70	70	60	70	70	70	70	70	70	70	70	70	70	70	70	80	70	70	70	97	97	97	97	97	97	97	97	97	97
37	I	25/11/2021	SK	120	120	120	120	120	130	60	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	80	97	97	97	97	97	97	97	97	97	97
38	I	29/11/2021	RP	130	120	120	120	120	120	80	80	80	70	70	70	70	80	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	97	97	97	97	97	97	97	97	97	97
39	I	30/11/2021	SR	120	120	120	120	120	120	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	80	80	80	70	99	99	99	99	99	99	99	99	99	99
40	I	12-08-2021	GS	120	120	120	120	130	130	80	80	80	80	80	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	80	98	98	98	98	98	98	98	98	98	98
41	S	23/12/2021	S	120	120	120	120	120	120	80	80	80	80	80	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	98	98	98	98	98	98	98	98	98	98
42	S	28/12/2021	K	110	110	110	110	110	110	80	80	80	80	80	80	80	80	80	80	80	70	60	70	70	70	70	70	70	70	70	70	70	70	70	98	98	98	98	98	98	98	98	98	98
43	S	24/01/2022	B	120	120	120	120	130	130	70	70	70	70	70	70	80	80	80	70	70	70	70	70	70	70	70	70	70	70	70	70	70	80	70	97	97	97	97	97	97	97	97	97	97
44	S	03-02-2022	A	120	130	130	130	130	120	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	97	97	97	97	97	97	97	97	97	97
45	S	02-03-2022	RD	130	130	130	130	130	130	70	70	80	70	70	80	80	80	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	98	98	98	98	98	98	98	98	98	98
46	S	03-02-2022	AS	120	120	130	130	130	130	80	80	80	80	80	70	70	70	70	70	70	80	80	80	80	80	70	70	70	80	80	80	80	80	80	97	97	97	97	97	97	97	97	97	97
47	S	05-02-2022	D	110	110	110	110	120	120	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	98	98	98	98	98	98	98	98	98	98
48	S	10-02-2022	HK	120	120	120	120	120	120	80	80	80	80	80	80	80	80	70	70	80	80	80	80	80	80	70	70	70	70	70	70	80	80	80	97	97	97	97	97	97	97	97	97	97
49	S	16/02/2022	TJ	120	120	120	120	120	120	80	80	80	70	70	70	80	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	96	96	96	96	97	97	97	96	97	97
50	S	24/02/2022	TK	120	120	120	120	120	120	70	80	70	70	70	70	70	70	80	80	80	80	70	70	70	70	70	70	70	70	70	70	70	70	70	97	97	97	97	97	97	97	97	97	97

Sr. No	Randomization code	Enrollment date	Name																NRS																														Time of first rescue a				
				10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	0	1	2	3	4
22	I	26/07/2021	AC	96	96	96	96	96	96	96	96	96	96	96	96	97	97	97	0	1	2	2	3	6	2	3	2	2	2	3	7	3	3	3	2	2	3	3	7	3	3	3	3					
23	I	27/08/2021	SS	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	0	1	1	1	2	2	6	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
24	I	28/08/2021	SB	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	0	0	1	2	2	3	3	7	3	3	3	2	2	2	2	5	2	3	2	2	2	3	3	6	3					
25	S	07-09-2021	KS	98	97	97	97	97	97	97	97	98	98	98	98	97	98	98	0	0	0	1	1	1	2	2	3	5	3	3	2	2	2	1	1	1	1	1	1	1	1	1	1					
26	I	14/09/2021	MD	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	0	0	0	2	2	2	3	6	3	2	2	3	3	5	3	3	2	2	2	1	1	1	1	0	0					
27	I	21/09/2021	RJ	98	98	98	98	98	97	97	97	97	97	98	98	98	98	98	0	1	1	2	3	3	6	3	3	3	2	2	3	3	5	3	2	2	2	3	3	6	3	2	2					
28	I	23/09/2021	DK	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	0	0	0	1	1	1	1	1	2	3	3	5	3	2	2	1	1	1	1	1	3	3	3	4	0					
29	I	23/09/2021	SD	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	0	0	0	2	2	2	3	3	5	2	2	2	1	1	1	1	2	2	2	2	5	3	1	1	1					
30	S	02-11-2021	BD	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
31	I	11-05-2021	TR	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	0	0	1	1	1	1	1	2	2	5	3	3	3	2	2	2	2	3	3	3	3	6	3	2	2					
32	S	11-09-2021	MS	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0					
33	I	11-11-2021	K	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	0	0	0	0	1	1	3	2	5	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1					
34	S	13/11/2021	RB	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	0	0	0	0	0	0	0	2	2	2	5	2	2	2	1	1	2	2	3	4	2	2	1	1	1					
35	I	25/11/2021	SK	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	0	0	0	0	0	0	1	1	2	2	3	3	6	3	2	2	1	1	1	1	1	1	3	3	7					
36	I	25/11/2021	PK	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	0	0	0	1	1	2	2	2	2	3	4	3	2	2	1	1	1	1	1	1	1	1	1	1	1					
37	I	25/11/2021	SK	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	0	0	1	1	1	3	3	3	4	3	3	3	3	2	2	1	6	3	3	2	2	2	3	2	4					
38	I	29/11/2021	RP	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	0	1	1	2	2	2	6	3	2	2	2	1	1	1	1	0	0	0	3	2	3	4	2	2	2					
39	I	30/11/2021	SR	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	4	2	2	1	0	0					
40	I	12-08-2021	GS	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	0	0	0	0	0	0	3	3	2	3	6	3	3	3	2	1	1	0	0	0	3	3	5	3	3					
41	S	23/12/2021	S	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0					
42	S	28/12/2021	K	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	0	0	0	0	0	0	2	0	2	2	2	3	6	3	3	2	2	0	0	0	0	0	0	0	0					
43	S	24/01/2022	B	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1	0	0	0	0	0	0	0	0	0	0					
44	S	03-02-2022	A	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	0	0	1	2	1	1	2	2	3	4	3	2	2	1	1	1	1	1	1	3	3	3	4	3	2					
45	S	02-03-2022	RD	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	0	0	1	2	2	3	3	5	3	3	3	2	1	1	1	1	1	0	0	0	0	0	0	0	0					
46	S	03-02-2022	AS	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	0	0	0	0	2	2	0	0	0	3	3	3	6	3	3	2	2	2	1	1	1	1	1	1	1					
47	S	05-02-2022	D	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	0	0	0	0	1	1	1	1	1	1	1	2	2	2	1	1	0	0	0	0	1	1	4	2	1					
48	S	10-02-2022	HK	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	0	0	0	0	1	1	2	3	3	2	3	3	6	3	3	2	2	1	1	1	1	2	2	4	2					
49	S	16/02/2022	TJ	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	0	0	0	0	1	1	0	0	1	1	1	2	2	1	1	2	2	1	1	1	1	1	1	1	1					
50	S	24/02/2022	TK	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	0	0	0	0	0	1	1	1	2	4	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0					

Sr. No	Randomization code	Enrollment date	Name	nalgesic given (minutes)																				Amount of analgesic given (mg)												
				5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	0	1	2	3	4	5	6	7	8	9	10	11	12
22	I	26/07/2021	AC	1st							2nd								3rd										50							50
23	I	27/08/2021	SS		1st																									50						
24	I	28/08/2021	SB			1st								2nd								3rd									50						
25	S	07-09-2021	KS					1st																								50				
26	I	14/09/2021	MD			1st						2nd																		50						
27	I	21/09/2021	RJ		1st								2nd							3rd										50						
28	I	23/09/2021	DK							1st												2nd												50		
29	I	23/09/2021	SD			1st													2nd											50						
30	S	02-11-2021	BD																																	
31	I	11-05-2021	TR					1st												2nd												50				
32	S	11-09-2021	MS																																	
33	I	11-11-2021	K																												50					
34	S	13/11/2021	RB						1st									2nd															50			
35	I	25/11/2021	SK								1st											2nd														50
36	I	25/11/2021	PK																														50			
37	I	25/11/2021	SK				1st								2nd								3rd								50					
38	I	29/11/2021	RP		1st															2nd										50						
39	I	30/11/2021	SR															1st																		
40	I	12-08-2021	GS						1st												2nd												50			
41	S	23/12/2021	S																																	
42	S	28/12/2021	K							1st																								50		
43	S	24/01/2022	B																																	
44	S	03-02-2022	A					1st													2nd										50					
45	S	02-03-2022	RD			1st																								50						
46	S	03-02-2022	AS								1st																									50
47	S	05-02-2022	D																		1st															
48	S	10-02-2022	HK								1st											2nd														50
49	S	16/02/2022	TJ																																	
50	S	24/02/2022	TK					1st																								50				

Sr. No	Randomization code	Enrollment date	Name	13	14	15	16	17	18	19	20	21	22	23	24	Total amount of rescue analgesic used in 24 hours period	Time at which NRS Score is ≥ 4 for the first time post-operatively	Total Duration of analgesia of FICB	Postop nausea and vomiting (within 24 hrs)	Any other postop complication (?)	Overall patient satisfaction for pain management (within 24 hrs)
22	I	26/07/2021	AC								50					150mg	5th hour	5 hours	none	none	Neither satisfied nor dissatisfied
23	I	27/08/2021	SS													50mg	6th hour	6hours	none	none	Very satisfied
24	I	28/08/2021	SB			50								50		150mg	7th hour	7hours	none	none	Dissatisfied
25	S	07-09-2021	KS													50mg	9th hour	9 hours	none	none	Satisfied
26	I	14/09/2021	MD	50												100mg	7th hour	7 hours	none	none	Neither satisfied nor dissatisfied
27	I	21/09/2021	RJ		50							50				150mg	6th hour	6 hours	none	none	Dissatisfied
28	I	23/09/2021	DK											50		100mg	11th hour	11hours	none	none	Satisfied
29	I	23/09/2021	SD								50					100mg	7th hour	7hours	none	none	Satisfied
30	S	02-11-2021	BD													0	never	24hours	none	none	Very satisfied
31	I	11-05-2021	TR									50				100mg	9th hour	9hours	none	none	Neither satisfied nor dissatisfied
32	S	11-09-2021	MS													0	never	24hours	none	none	Satisfied
33	I	11-11-2021	K													50	8th hour	8 hours	none	none	Very satisfied
34	S	13/11/2021	RB							50						100mg	10th hour	10hours	none	none	Neither satisfied nor dissatisfied
35	I	25/11/2021	SK												50	100mg	12th hour	12hours	none	none	Satisfied
36	I	25/11/2021	PK													50mg	10th hour	10hours	none	none	Satisfied
37	I	25/11/2021	SK				50								50	150mg	8th hour	8hours	none	none	Dissatisfied
38	I	29/11/2021	RP								50					100mg	6th hour	6hours	none	none	Neither satisfied nor dissatisfied
39	I	30/11/2021	SR							50						50mg	19th hour	19 hours	none	none	Very satisfied
40	I	12-08-2021	GS										50			100mg	10th hour	10hours	none	none	Neither satisfied nor dissatisfied
41	S	23/12/2021	S													0	never	24hours	none	none	Very satisfied
42	S	28/12/2021	K													50mg	11th hour	11hours	none	none	Satisfied
43	S	24/01/2022	B													0	never	24 hours	none	none	Satisfied
44	S	03-02-2022	A										50			100mg	9th hour	9hours	none	none	Satisfied
45	S	02-03-2022	RD													50mg	7th hour	7hours	none	none	Satisfied
46	S	03-02-2022	AS													50mg	12th hour	12hours	none	none	Satisfieds
47	S	05-02-2022	D										50			50mg	22th hour	22hours	none	none	Very satisfied
48	S	10-02-2022	HK											50		100mg	12th hour	12hours	none	none	Neither satisfied nor dissatisfied
49	S	16/02/2022	TJ													0	never	24hours	none	none	Very satisfied
50	S	24/02/2022	TK													50mg	9 th hour	9hours	none	none	Satisfied

No. BFUHS/2K21p-III/ 76

Date 4/11/21

The Principal,
DMC, Ludhiana.

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 29.10.2021 has approved the plan of thesis of **Sunanda Sethi**, a student of your college for **MD Anaesthesiology** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis

Ultrasound guided suprainguinal versus infrainguinal approach of fascia iliaca compartment block for postoperative analgesia in above knee lower limb surgeries: a prospective randomized study.

Supervisor

Dr. Mirley Rupinder Singh
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Note :

29. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*
30. *The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

ULTRASOUND GUIDED SUPRAINGUINAL VERSUS INFRAINGUINAL APPROACH OF FASCIA ILIACA COMPARTMENT BLOCK FOR POSTOPERATIVE ANALGESIA IN ABOVE KNEE LOWER LIMB SURGERIES: A PROSPECTIVE RANDOMIZED STUDY

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

DOCTOR OF MEDICINE

In

ANAESTHESIOLOGY

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES

FARIDKOT

MARCH 2020

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ABSTRACT OF PLAN OF THESIS

Title	ULTRASOUND GUIDED SUPRAINGUINAL VERSUS INFRAINGUINAL APPROACH OF FASCIA ILIACA COMPARTMENT BLOCK FOR POSTOPERATIVE ANALGESIA IN ABOVE KNEE LOWER LIMB SURGERIES: A PROSPECTIVE RANDOMIZED STUDY
For the dĕgree of	M.D. Anaesthesia
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Introduction: The Fascia Iliaca Compartment Block (FICB) has been widely used for perioperative analgesia in patients undergoing lower limb fracture fixation & arthroplasty. FICB has two approaches, the Suprainguinal and the Infrainguinal approach.

Aim of Study: To compare the efficacy of ultrasound guided suprainguinal approach with infrainguinal approach of fascia iliaca compartment block for postoperative pain relief.

Materials & methods: A prospective, double blind, randomized study will be conducted on 50 Patients undergoing orthopedic above knee lower limb surgeries under subarachanoid block after which they would randomly be allocated to either of the 2 study groups of 25 patients each – Group S will receive ultrasound guided FICB block by suprainguinal approach and Group I will receive FICB by infrainguinal approach. Consumption of total amount of rescue analgesic in 24 hour period in both groups will be recorded as primary outcome. Numerical Rating Scale (NRS) scores, duration of analgesia, post operative nausea and vomiting and patient satisfaction score will be recorded as secondary outcome. Data thus collected will be statistically analysed.

Clinical Significance: Adequate postoperative analgesia is essential for early rehabilitation and mobilization, and patient satisfaction. FICB provides good postoperative analgesia for lower limb above knee orthopedic surgeries reducing the need for post operative opioid administration. Limited literature has been found comparing the two approaches of FICB.

Keywords: Ultrasound guided, Fascia iliaca compartment block, regional anaesthesia, Post operative Analgesia, Ropivacaine

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CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"ULTRASOUND GUIDED SUPRAINGUINAL VERSUS INFRAINGUINAL APPROACH OF FASCIA ILIACA COMPARTMENT BLOCK FOR POSTOPERATIVE ANALGESIA IN ABOVE KNEE LOWER LIMB SURGERIES :A PROSPECTIVE RANDOMIZED STUDY"** exist in the Department of Anaesthesiology at Dayanand Medical College and Hospital, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis are genuine and is collected by the candidate herself under our supervision and guidance.

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6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Lower limb fractures of long bones and arthroplasty surgeries of hip and knee have been associated with severe postoperative pain requiring substantial narcotic administration for analgesia .[1]. Fracture related pain both before and after surgery is usually reported as severe by most patients. Those who report more severe pain after surgery have longer hospital stays and greater delays before mobilization.

Adequate postoperative analgesia is essential for early rehabilitation and mobilization, and patient satisfaction. Currently, there is no consensus on the best strategy for perioperative anaesthesia and postoperative analgesia.

The ideal method of pain relief would include ease of administration, lack of major side effects and the ability for the patient to be discharged from the Post Anaesthesia Care Unit with hope of maximum pain free hours and minimal side effects. Within the scope of enhanced recovery after surgery (ERAS) protocols, a variety of Regional anaesthesia techniques have been shown to improve analgesia, compared to opioids.[2,3]

Regional Anaesthesia (RA) techniques can play an important role in limiting analgesia and reducing opioid consumption, thus improving functional recovery as well as patient satisfaction. By reducing opioid consumption, RA may also decrease opioid-related side effects. However, it is important that the analgesia of RA technique lasts for a substantial time period after surgery in order not to interfere with early rehabilitation and mobilization.[4,5] A faster recovery might also result in a faster hospital discharge and, therefore, have a positive economic effect.[6,7]

Patients having lower limb fractures are usually elderly with multiple co-morbidities and experience varying intensity of pain necessitating the use of either parenteral or central neuraxial techniques like continuous epidural analgesia for postoperative pain relief. Both these modalities are fraught with adverse side effects like drowsiness or motor block which may adversely affect dynamic pain relief and rehabilitation.

Therefore the need for effective postoperative pain control after lower limb surgeries has led to the development of numerous regional analgesic techniques. Out of all the regional anaesthesia techniques, Nerve blocks are reported to be more effective for perioperative pain management than other analgesic techniques.[8] Because peripheral nerve blocks confine anaesthesia to the surgical region, many disadvantages of neuraxial blocks can be avoided.

Paraesthesia and nerve stimulation have been used for decades to locate the nerves during the performance of regional anaesthesia. Nerve stimulation remains unreliable, due to its low sensitivity, in terms of detecting the intraneural positioning of the needle [9]. Over the last two decades, ultrasonography has been used to improve the success of RA and prevent nerve damage.[10]

With the latest advancements in regional anaesthesia techniques, the Fascia Iliaca Compartment Block (FICB) has been widely used for perioperative analgesia in patients undergoing lower limb fracture fixation & arthroplasty.

There are two techniques of Fascia Iliaca Compartment Block (FICB) administration that have been described in the literature, a conventional infrainguinal approach by Dalens [11] and a modified suprainguinal approach by Stevens [12]. The modified suprainguinal approach of FICB advised by Stevens has more proximal spread of local anaesthetics, which is further confirmed in a cadaveric study [13].

Since there are very few studies comparing the suprainguinal approach with the infrainguinal approach of FICB for postoperative pain relief , hence we propose to compare the efficacy of ultra sound guided suprainguinal approach of FICB with that of infrainguinal approach of FICB for postoperative pain relief in above knee lower limb orthopaedic surgeries.

6.2 REVIEW OF LITERATURE

Pain is a sensory emotional experience. It originates from external noxious stimuli from the environment that cause a localized sensation in a part of body, to which the individual's response will be to terminate or escape the source of stimulus.

Orthopaedic surgery is considered one of the most painful procedures during the post-operative period. Poorly controlled postoperative pain is the source of discomfort, non-planned hospitalisation, readmission, metabolic complications, delayed functional recovery and patient dissatisfaction. The pain felt upon returning home is the most common complaint of patients and the main cause of failures in ambulatory care

Out of all the regional anaesthesia techniques, Nerve blocks are reported to be more effective for perioperative pain management than other analgesic techniques. Because peripheral nerve blocks confine anaesthesia to the surgical region, therefore many disadvantages of neuraxial blocks can be avoided.

Use of ultrasonography to locate nerves now leads to increased success rate, with fast implementation of the nerve blocks and reduction of the associated risks (intravascular injection, nerve injury, etc.). Ultrasound-guided technique has also made it feasible to perform peripheral nerve blocks that were previously difficult to carry out.

The Fascia Iliaca Compartment Block (FICB) has been used for perioperative analgesia in patients undergoing lower limb surgeries. The FICB has a higher rate of simultaneous block of the femoral and lateral femoral cutaneous nerve than perivascular femoral nerve block.[11]

FICB evolved from a blind, landmark-based, paravascular technique to an Ultrasound guided technique and from a more distal (infra-inguinal) to a more proximal (supra-inguinal) approach.

A.P. Winnie et al in 1973 conducted a study titled "The Inguinal Paravascular Technic of Lumbar Plexus Anesthesia: The "3 -in - 1 Block in which they described the inguinal paravascular technique for

lumbar plexus blockade, the so-called “3-in-1 block.” They concluded that with a “3-in-1 block,” only the femoral and lateral cutaneous nerves can be reliably blocked, whereas the ON is often spared. Their initial report demonstrated a consistent block of the three target nerves with volumes exceeding 20 mL, it could not be confirmed by subsequent clinical and radiological trials[14]

Dalen et al in 1989 conducted a study to evaluate the efficacy and reliability of a new anterior approach of lumbar plexus block called the FICB. They compared it with 3 in 1 block procedure in 120 pediatric patients undergoing lower limb surgeries. Both blocks were given using landmark technique and anaesthetic solution consisting of 1% Lidocaine with 0.5% bupivacaine both with 1:200,000 epinephrine. In this study they found that the group that received FICB had more adequate analgesia and high degree of sensory blockade of lumbar plexus nerves that supply the thigh using reasonable amounts of local anaesthetic compared to the 3 in 1 block. [11]

With the introduction of ultrasound, the fascia iliaca can be visualised, enabling a more accurate positioning of the needle and better deposition of local anaesthesia below the fascia iliaca. Dolan (2008) was the first to describe the FICB using ultrasound.[15]

Dolan et al in 2008 compared efficacy of FICB performed by loss of resistance technique and ultrasound guided technique. The study was conducted on 80 patients undergoing hip or knee surgery. They found out that ultrasound guided FICB increased the frequency of sensory loss in medial aspect of thigh. Ultrasound guidance also increased the frequency of femoral nerve and obturator nerve motor block. [15]

Hebbard et al in 2011 developed a new ultrasound guided supra-inguinal approach. He conducted a study on 6 unembalmed human cadavers by administering ultrasound guided suprainguinal FICB. They found out that ultrasound guided suprainguinal FICB has the advantage of placing the local anaesthetic agent more directly into the target area for FICB than pre-existing techniques as well as facilitating catheter placement. [16]

Kumar et al in 2015 conducted a study comparing the conventional infrainguinal and modified proximal suprainguinal approach of Fascia Iliaca Compartment Block for postoperative analgesia. The study was conducted on 40 patients scheduled for total hip arthroplasty. They found out that suprainguinal approach has greater opioid sparing effect compared to infrainguinal approach of FICB at 6, 12 and 24 hours for optimal analgesia in postoperative period.[17]

Hards et al in 2018 conducted a metanalysis in which Seven studies involving 699 patients were included. They studied the Efficacy of Prehospital Analgesia with Fascia Iliaca Compartment Block for Femoral Bone Fractures and found that Out of a total of 254 prehospital FICBs, there was a success rate of 90% and only one adverse effect reported. They concluded that the FICB is suitable for use in the prehospital environment for the management of femoral fractures, it is a useful analgesic technique but they suggested that further research is required to investigate its effectiveness compared to systemic opioids. [18]

Kris et al in 2019 conducted a volunteer study on 10 healhty individuals to prove that Supra-inguinal injection for fascia iliaca compartment block results in more consistent spread towards the lumbar plexus than a infra-inguinal injection. Both infrainguinal and suprainguinal FICB were given on left and right side of each volunteer using 40 ml of 0.5% lidocaine. They found that after suprainguinal FICB 80% of the volunteers had a complete sensory block of the medial, anterior and lateral region of the thigh compared with 30 % after infrainguinal FICB. They conclude that suprainguinal FICB produces more complete sensory block of the medial, anterior and lateral region of the thigh compared with infrainguinal FICB. [19]

6.3 AIMS AND OBJECTIVES OF THE STUDY

To compare the analgesic efficacy of ultra sound guided suprainguinal approach of fascia iliaca compartment block with that of infrainguinal approach of fascia iliaca compartment block for postoperative pain relief.

7. MATERIALS AND METHODS

7.1 SOURCE OF DATA

A randomized double blind observational study will be conducted in the department of Anaesthesiology, Dayanand Medical College &Hospital, Ludhiana after approval by Institutional Ethics Committee on a total of 50 adult patients undergoing above knee lower limb surgeries under subarachnoid block who would be randomly allocated to either of the 2 study groups of 25 patients each by computer generated randomization codes contained in sealed, sequentially numbered envelopes. A written informed consent will be obtained from each patient.

7.2 METHOD OF COLLECTION OF DATA

INCLUSION CRITERIA

- ASAI, II& III patients above 18 years of age.
- Patients scheduled for above knee lower limb orthopaedic surgeries.
- Cognitive ability to comprehend and understand NRS scale.

EXCLUSION CRITERIA

- Patient having contraindications for Sub-arachnoid block
- Coagulopathy
- Infection at injection site
- Allergy to local anaesthetic drugs
- Patients receiving Epidural block for Lower Limb surgeries
- Diabetic neuropathy& other neurological deficits in lower limb.

GROUP ALLOCATION:

A total of 50 patients will be recruited for the study and will be allocated randomly using computer generated random number list to either of the 2 groups. All patients will be randomized into two groups, group S and group I.

All patients in both groups will receive a standard anaesthesia technique of subarachnoid block in sitting position under all aseptic conditions. Then the patients will be placed in supine position and they will receive ultrasound guided FICB by different approaches according to their allocated groups.

GROUP S:

Comprising of 25 patients who will receive local anaesthetic solution of 30 mL of 0.2% ropivacaine using ultrasound guided suprainguinal approach

GROUP I**:**

Comprising of 25 patients who will receive local anaesthetic solution of 30 mL of 0.2% ropivacaine using ultrasound guided infrainguinal approach

The randomization scheme using computer generated random number will be prepared by the biostatistician and those involved in the study would be unaware of the group allocation. The allocation envelope will be opened by an anaesthesiologist who would not be involved with the direct clinical care of the patient and the same anaesthesiologist will administer the block. A blinded observer will assess the postoperative pain scores and 24-hour opioid consumption. This observer will not be involved in the direct clinical care of the patient. These codes would be decoded at the end of study period.

PREANAESTHETIC CHECKUP

Routine thorough preanaesthetic check-up will be conducted comprising of detailed history, comorbidities, allergy to any drug being used, general physical and systemic examination. Patients will be explained about the study being conducted and written informed consent will be taken and also educated on the use of NRS scale. Relevant investigations will be sent and reviewed. Demographic information including BMI, age and sex, type of lower limb surgery will be recorded. Oral premedication in the form of pantoprazole 40 mg and alprazolam 0.25 mg will be given on the morning of surgery with sip of water.

ANAESTHESIA TECHNIQUE

On arrival in the Operating Room, patients will be positioned on the operating table in the supine position and routine monitoring in the form of 5-lead electrocardiography, non-invasive blood pressure (NIBP), temperature and pulse oximeter will be instituted. Heart rate (HR) will be recorded using 5 lead electrocardiography

and non-invasive blood pressure (NIBP) using an automated non-invasive device that will be recycled every 1 min until three consecutive measurements of systolic blood pressure (SBP) , diastolic blood pressure (DBP) and mean arterial pressure (MAP) will be recorded and mean of three readings will be recorded as baseline.

All patients in both groups will receive a standard anaesthesia technique of subarachnoid block with 3 ml anaesthetic solution constituting of 2.5 ml hyperbaric 0.5% bupivacaine with 0.5 ml of 25 mcg fentanyl in sitting position under all aseptic conditions. The adequacy of spinal block will be assessed by level of sensory block and motor block (using Modified Bromage Scale). Then the patients of both groups will be placed in supine position and they will receive ultrasound guided FICB by different approaches according to their allocated groups.

Group S patients will receive FICB using ultrasound guided suprainguinal approach with a high frequency (6-14Mhz) linear probe in the supine position. Initially, the anterior superior iliac spine (ASIS) will be palpated. The transducer will be placed in the inguinal crease to identify the femoral artery in the short axis. From the femoral artery, the transducer will be translated laterally to identify the sartorius muscle. The sartorius will be traced cephalad to its insertion on the anterior superior iliac spine. Using this technique, the hypoechoic shadow of the anterior superior iliac spine is easily identifiable just cephalad to the insertion of the sartorius. Medial to the shadow of the anterior superior iliac spine lies the iliacus muscle. With the anterior superior iliac spine and iliacus identified, the medial end of the transducer will be rotated to point at the umbilicus, which is the final transducer position. With the transducer in the final position, sonographic anatomy will be identified, from superficial to deep, consisting of subcutaneous fat, the internal oblique muscle, the transverse abdominus muscle, the fascia iliaca overlying the iliacus muscle, and the iliacus muscle itself. A 21-gauge, 100-mm block needle (Stimuplex; B. Braun, Bethlehem, PA) will be advanced in-plane fashion from caudal to cephalad end to puncture the fascia iliaca. With the needle tip just below the fascia iliaca, 2 mL of a

local anaesthetic will be injected to confirm the tip location. Once the proper position is confirmed, 30 mL of 0.2% ropivacaine will be incrementally injected superficial to the iliacus muscle and deep to the fascia iliaca. After completion of the injection, the transducer will be translated medially toward the femoral nerve, where caudomedial spreading of the local anaesthetic will be easily identified.[20]

Group I patients will receive FICB by ultrasound guided Infrainguinal approach. In the supine position as before, a high frequency (6-14Mhz) linear probe will be placed transversely to identify the femoral artery at the inguinal crease. The iliopsoas muscle with the overlying fascia iliaca will be identified and the hyperechoic Femoral Nerve is typically seen lying between the iliopsoas and fascia iliaca at a depth of 2-4 cm, lateral to the femoral artery. The probe will be tilted cranially and caudally until optimal images of the Femoral Nerve and fascia iliaca are obtained. The triangular shaped sartorius muscle and the anterior superior iliac spine (ASIS) will be identified on moving the probe laterally. After skin disinfection and local anaesthetic (LA) infiltration, a 100 mm blunt ended needle will be inserted using an in-plane technique with the aim of placing the needle tip beneath the fascia iliaca around the lateral third of a line between the ASIS and pubic tubercle. Aspiration will be performed before injection of 2 ml Local Anaesthetic. Once the proper position is confirmed, 30 mL of 0.2% ropivacaine will be incrementally injected. Correct needle placement will be confirmed by separation of the fascia iliaca from the iliopsoas muscle with Local Anaesthetic spreading towards the Femoral Nerve medially and the iliac crest laterally. .[18]

Both the patient and the observer will be blinded to the nature of FICB approach being used.

FOLLOWING OUTCOMES WILL BE OBSERVED POSTOPERATIVELY:

PRIMARY OUTCOME:

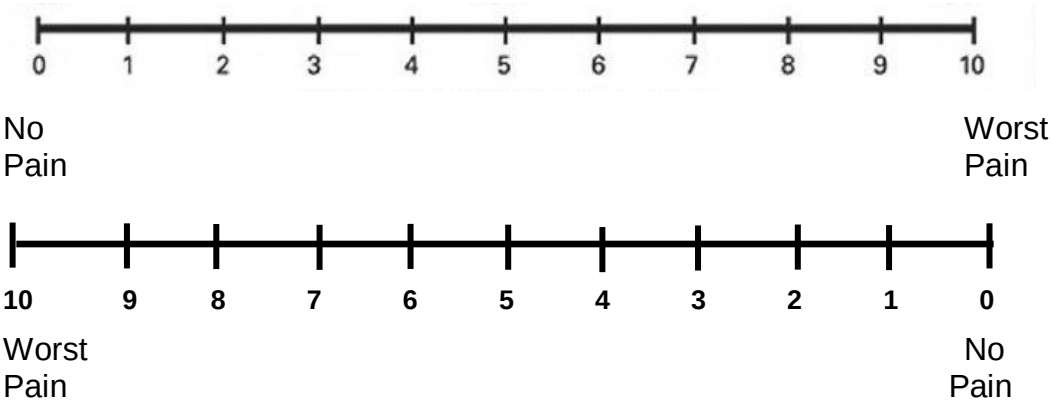
To compare the efficacy of ultra sound guided suprainguinal approach of FICB with that of infrainguinal approach of FICB for postoperative pain relief

- Comparative consumption of total amount of analgesic in 24 hour period among both groups.

SECONDARY OUTCOMES:

- Numerical rating scale (NRS) will be recorded every hour for 24 hours where the time zero will be time of initiation of block.

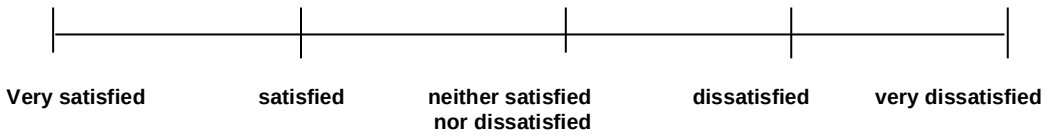
The score will be determined by asking the patient to rate the pain from 0-10, where in 0 being the least pain and 10 being the maximum.



- Duration of analgesia- Duration of analgesia will be defined as the time from initiation of block to the time of first requirement of rescue analgesic at NRS ≥4

  Injection paracetamol will be given to the patient every 8 hourly and Injection tramadol 50mg intravenous will be used as rescue analgesic whenever the NRS **≥** 4 to a maximum of 150 mg within 24 hours. Injection Ondansetron 4 mg i/v will be given along with injection Tramadol.

  - Post operative nausea and vomiting
  - Patient satisfaction score for pain management will be measured by asking the patient to rate their satisfaction on a 5-point Likert scale 24 hours after surgery.



STATISTICAL ANALYSIS

t tests - Means: Difference between two independent means (two groups)

Analysis: Post hoc: Compute achieved power

Input: Tail(s) = Two

Effect size d = 1.6205823

α err prob = 0.05

Sample size group 1 = 25

Sample size group 2 = 25

Output: Noncentrality parameter δ = 5.124731

Critical t = 2.024394

Df = 38

Power (1-β err prob) = 0.998784

A post hoc power analysis was conducted using the software package, G*Power version 3.1.9.2 (Franz Faul, university kiel, Germany). The alpha level used for this analysis was $p<0.05$ and beta was 0.20. Sample size was estimated from the results of previous study (23) using the Morphine consumption as the parameter, which is the primary outcome of our study. Our sample size came out to be 25 subjects per group at power of 0.99 and with an effect size of 1.62 with 10% chance of error with $\alpha = 0.05$, $\beta = 0.20$ and confidence interval of 95%.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

The study does not require any investigation or intervention other than those routinely done for every patient of above knee lower limb orthopaedic surgeries.

7.4 HAS ETHICAL CLEARENCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Attached along with.

LIST OF REFERENCES

1. Suarez JC, Al-Mansoori AA, Kanwar S. Effectiveness of novel adjuncts in pain management following total knee arthroplasty: a randomized clinical trial. J Arthroplasty. 2018;33:S136-S141.
2. Becchi C, Al Malyan M, Coppini R, Campolo M, Magherini M, Boncinelli S. Opioid-free analgesia by continuous psoas compartment block after total hip arthroplasty. A randomized study. EJA. 2008;25:418-23.
3. Stevens M, Harrison G, McGrail M. A modified fascia iliaca compartment block has significant morphine-sparing effect after total hip arthroplasty. Anaesth Int care. 2007;35:949-52.
4. Neuman MD, Silber JH, Elkassabany NM, Ludwig JM, Fleisher LA. Comparative effectiveness of regional versus general anesthesia for hip fracture surgery in adults. Anesthesiology. 2012;117:72-92.
5. Opperer M, Danninger T, Stundner O, Memtsoudis SG. Perioperative outcomes and type of anesthesia in hip surgical patients: An evidence based review. World J Orthop. 2014;5:336-43.
6. Desai V, Chan PH, Prentice HA. Is Anesthesia Technique Associated With a Higher Risk of Mortality or Complications Within 90 Days of Surgery for Geriatric Patients With Hip Fractures? Clin Orthop Rel Res. 2018;476:1178-88.
7. Qiu C, Chan PH, Zohman GL, Prentice HA, Hunt JJ, LaPlace DC, et al. Impact of Anesthesia on Hospital Mortality and Morbidities in Geriatric Patients Following Emergency Hip Fracture Surgery. J Orthop Trauma. 2018;32:116-23.
8. Guay J, Johnson RL, Kopp S. Nerve blocks or no nerve blocks for pain control after elective hip replacement (arthroplasty) surgery in adults. Cochrane Database Syst Rev. 2017;10:CD011608
9. Tsai TP, Vuckovic I, Dilberovic F. Intensity of the stimulating current may not be a reliable indicator of intraneural needle placement. Reg Anesth Pain Med. 2008;33:207-10.

10. Gadsden J, McCally C, Hadzic A. Monitoring during peripheral nerve blockade. Curr Opin Anaesthesiol. 2010;23:656-61.
11. Dalens B, Vanneuville G, Tanguy A. Comparison of the fascia iliaca compartment block with the 3-in-1 block in children, Anesth. Analg. 1989;69:705-13.
12. Stevens M, Harrison G, McGrail M. A modified fascia iliaca compartment block has significant morphine-sparing effects, Anaesth. Int. Care. 2007;35:949-52.
13. Hebbard P, Ivanusic J, Sha S. Ultrasound-guided suprainguinal fascia iliaca block : a cadaveric evaluation of a novel approach. Anaesthesia. 2011;66:300-5.
14. Winnie AP, Ramamurthy S, Durrani Z. The inguinal paravascular technic of lumbar plexus anesthesia: the “3-in-1 block”. Anesthesia & Analgesia. 1973;52(6):989-96.
15. Dolan J, Williams A, Murney E, Smith M, Kenny GN. Ultrasound guided fascia iliaca block: a comparison with the loss of resistance technique. Reg Anesth Pain Med. 2008;33:526-31
16. Hebbard P, Ivanusic J, Sha S. Ultrasound-guided supra-inguinal fascia iliaca block: a cadaveric evaluation of a novel approach. Anaesthesia. 2011;66:300-5.
17. Kumar K, Pandey RK, Bhalla AP, Kashyap L, Garg R, Darlong V, et al. Comparison of conventional infrainguinal versus modified proximal suprainguinal approach of Fascia Iliaca Compartment Block for postoperative analgesia in Total Hip Arthroplasty. A prospective randomized study. Acta Anaesthesiol Belg. 2015;66:95-100.
18. Hards M, Brewer A, Bessant G, Lahiri S. Efficacy of prehospital analgesia with fascia iliaca compartment block for femoral bone fractures: a systematic review. Prehospital and disaster medicine. 2018;33(3):299.
19. Vermeylen K, Desmet M, Leunen I, Soetens F et al. Supra-inguinal injection for fascia iliaca compartment block results in more consistent spread towards the lumbar plexus than an infra-inguinal injection: a volunteer study. Reg Anesth Pain Med. 2019;0:1–9.

20. O’Reilly N, Desmet M, Kearns R. Fascia iliaca compartment block. BJA Education. 2019;6:191-7.

PROFORMA

Randomization code:

Enrollment date:

SR No:

Name:

MRD No:

Age:

Gender:

Type of Lower Limb surgery:

ASA grade:

Time of Subarachnoid Block:

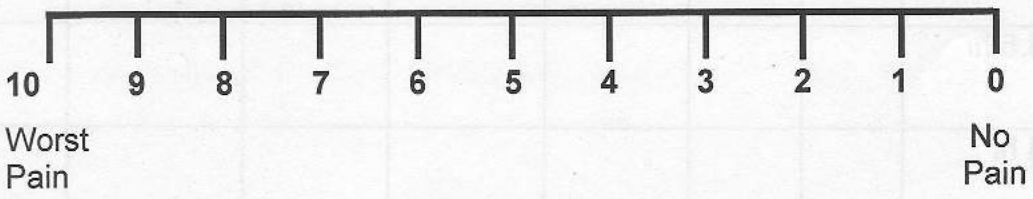
Level of sensory blockade:

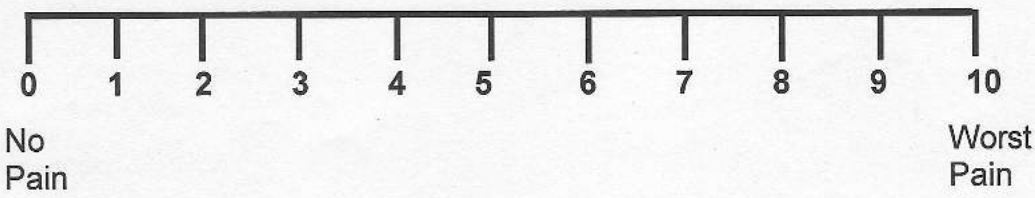
Level of motor blockade (Modified Bromage Scale):

Time of institution of FICB block :

Duration of surgery in minutes (time from skin incision to closure):

NUMERICAL RATING SCALE (PAIN SCALE)





Signature of Candidate **Signature of Supervisor**

INTRA OPERATIVE VITALS

Time	Time	Heart Rate (bpm)	SBP (mmHg)	Mean Arterial Pressure (mmHg)	DBP (mmHg)	Oxygen Saturation (%)	Respiratory Rate (per minute)
Baseline							
0 min (initiation of block)							
30 mins							
1 hr							
1.5 hr							
2 hr							
2.5 hr							
3 hr							
3.5 hr							
4 hr							

Signature of Candidate **Signature of Supervisor**

POST OPERATIVE VITALS

Time since FICB (hours)	Heart rate (bpm)	SBP (mm Hg)	DBP (mm Hg)	Oxygen Saturation (%)	NRS	Time of first rescue analgesic given (minutes)	Amount of analgesic given (mg)
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							

Signature of Candidate **Signature of Supervisor**

Total amount of rescue analgesic used in 24 hours period: mg

Time at which NRS Score is ≥ 4 for the first time post-operatively:

Total Duration of analgesia of FICB:

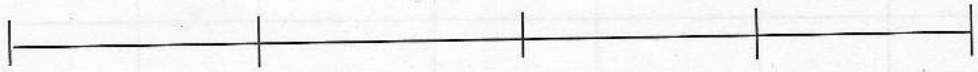
Postop nausea and vomiting (within 24 hrs):

- ☐ None-0
- ☐ Mild-1
- ☐ Moderate-2
- ☐ Vomiting-3

Any other postop complication (?)

Overall patient satisfaction for pain management (within 24 hrs):

- ☐ very satisfied
- ☐ satisfied
- ☐ neither satisfied nor dissatisfied
- ☐ dissatisfied
- ☐ very dissatisfied



Very satisfied | satisfied | neither satisfied nor dissatisfied | dissatisfied | very dissatisfied

Signature of Candidate

Signature of Supervisor

INFORMED PATIENT CONSENT

Date: _____

I.....*.....D/o, W/o, S/o..... .....am willing to participate in the study **"ULTRASOUND GUIDED SUPRAINGUINAL VERSUS INFRAINGUINAL APPROACH OF FASCIA ILIACA COMPARTMENT BLOCK FOR POSTOPERATIVE ANALGESIA IN ABOVE KNEE LOWER LIMB SURGERIES :A PROSPECTIVE RANDOMIZED STUDY"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

....

Signature of the Witness Signature of the patient

Name:

Signature of Supervisor **Signature of Candidate**

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____ निवासी _____ इस शोधकार्य **"ULTRASOUND GUIDED SUPRAINGUINAL VERSUS INFRAINGUINAL APPROACH OF FASCIA ILIACA COMPARTMENT BLOCK FOR POSTOPERATIVE ANALGESIA IN ABOVE KNEE LOWER LIMB SURGERIES :A PROSPECTIVE RANDOMIZED STUDY"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____	_____
गवाह के हस्ताक्षर	रोगी के हस्ताक्षर/अंगूठे का निशान
नाम:	नाम:

_____
अन्वेषक के हस्ताक्षर

_____
विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____ਵਾਸੀ

_____

"ULTRASOUND GUIDED SUPRAINGUINAL VERSUS INFRAINGUINAL APPROACH OF FASCIA ILIACA COMPARTMENT BLOCK FOR POSTOPERATIVE ANALGESIA IN ABOVE KNEE LOWER LIMB SURGERIES :A PROSPECTIVE RANDOMIZED STUDY" ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____ _____

ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____ ਮਿਤੀ_____

ਪਤਾ _____ ਪਤਾ _____

_____

ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____

ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ